HANDGUNS OF THE WORLD

Edward C. Ezell

A comprehensive international guide to military revolvers and self-loaders

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Handguns of the World by Edward C. Ezell is THE reference book for all collectors — amateurs and professionals alike — of pistols and revolvers around the globe. Most handguns in use today, for business and pleasure both, have evolved from military weapons. Between 1870 and 1945, great effort was exerted to improve accuracy, efficiency, and fire power for the military, which in turn resulted in what we today consider classic firearms. In the *Handguns of the World,* Mr. Ezell has called upon his own expertise as well as that of gun collectors, historians, and other experts around the world. International specialists in Great Britain, Japan, Finland, Denmark, the Soviet Union, the United States, and many other countries, have personally assisted Mr. Ezell with research, sharing with him hundred-year-old documents and photographs. Many also allowed him to handle and photograph antique treasures from their national collections.

For anyone wanting to research the historical value of a privately owned antique, this book has all the answers: model numbers, manufacturers, exact locations of origin are all here.

Over 1,000 photographs and line drawings make it easy to pick out model numbers and match your weapon to a reproduction of classic models in this complete guide.

The historical drama and reference value of this book is beyond reproach. Mr. Ezell has faithfully recorded here in vivid detail the stories of the pistols, the men who designed them, and the companies who manufactured them: Browning, Colt, Smith and Wesson, Lefaucheux, Borchardt, Luger and many more.

From revolver to self-loader, author Ezell traces changes in design from the simplest to the most complicated innovations of later years, made possible by improved manufacturing equipment and techniques.

(continued on back flap)

Ezell

HANDGUNS OF THE WORLD

Stackpole Books

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Military Revolvers and Self-Loaders from 1870 to 1945

Edward C. Ezell

STACKPOLE BOOKS

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To Linda,
who is still a better
shot than I am

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PREFACE

Why write another book about handguns to add to the many volumes—some excellent, some good, many bad—that have been published in this field since 1945? Through reading and using most of these books during the last 20 years, I have discovered that many factual and technical details about handguns have gone unrecorded, despite the many titles and the varied subjects considered by numerous authors.

Over the years I have had many questions about handguns for which I could not readily find answers. There was also a noticeable lack of information about the men who created the handguns and the companies that manufactured them. In preparing *Handguns of the World,* I have tried to answer my own questions, presenting material about the pistols, their designers, and the manufacturers that will be new and useful to a broad spectrum of readers.

Handguns of the World tells the story of the evolution of military handguns from 1870 to 1945. Each chapter constitutes a mini-history of a specific topic—the handguns of a particular country or the work of particular designer. Throughout the book, I have examined the course of revolver and pistol development and have attempted to discover why specific technological paths were pursued during this development. Although this book is designed to tell more about the history of revolvers and self-loading pistols than has been written before in a single volume, it should not be considered exhaustive. Nor should it replace the many specialized well-written handgun books available. Instead, *Handguns of the World* and other titles should complement each other and be of value to a varied audience.

Students of history should find in *Handguns of the World* a beginning synthesis of information relating to the evolution of handguns. Collectors will find new background information about the arms they possess. Military personnel may gain additional understanding of the relationship between military technology (weapons) and weapon utilization (tactics). And police officers will have another source of information about the revolvers and pistols they encounter in their work.

Note on use of the Metric System

To simplify the text, I have used the metric system of weights and measurements instead of a combination of the metric and English systems. Some readers may feel uncomfortable with this decision, but I believe that it is an acceptable one given the gradual shift in the United States to the *systeme internationale d'unites.* In this book we are concerned with four basic metric units: grams for weight; millimeters for length; meters for distance and velocity; and joules for kinetic energy. Some multipliers will permit conversion of metric designations to English units.

Weight: To convert grams to ounces, multiply by 0.0353. Thus a 1,048 gram Colt Model 1873 Single-Action Revolver weighs 36.99 ounces. Pounds can be obtained by multiplying grams by .002204. The same Colt Single-Action weighs 2.31 pounds.

To convert grams to grains, for projectile weight, multiply by 15.43. Thus a 14.3 gram .45 caliber (11.43mm) bullet weighs 220 grains.

Length: To convert millimeters to inches, multiply by 0.0394. The Colt Single-Action's 191mm barrel translates to 7.5 inches. Its 127mm barrel is 5 inches long.

Meters, either for distance or velocity, can be converted to feet by multiplying by 3.281. Thus a target at 25 meters is 82 feet away. A bullet traveling 213 meters per second can also be said to have a velocity of 698 feet per second.

Energy: To convert joules for kinetic energy to foot-pounds, multiply by .7375. Thus a projectile with a muzzle energy of 390 joules has 287.6 foot-pounds in the English system.

In the accompanying text, conversions have generally been rounded off to the nearest whole number. Thus 287.6 would be cited as 288. This liberty has been taken because most weights, dimensions, and velocities are approximations. All of these figures should be useful for comparison, but it is important to note that handguns of the same model may vary a few millimeters in length or a few grams in weight. Projectile velocities are known to vary greatly, and projectile weights, for ammunition manufactured for fifty years or more, vary with different types of bullets and different dates of manufacture. Despite these cautions, the data presented in this book have been treated with care and should reflect a reasonable basis for comparing different handguns and handguns of the same type.

ACKNOWLEDGMENTS

Handguns of the World would not have been possible without the assistance and encouragement of many individuals. Each person's contribution helped to make the finished product more complete. Without the help of each person, the final book would have been less interesting to read and less satisfactorily illustrated.

In attempting to list the people who helped most in the writing and illustrating of this book a few must be singled out for special thanks. Among those deserving special thanks are: Vaclav (Jack) Krcma, Ian Hogg, Masami Tokoi, Henk Visser, and John Weeks for their contributions of photographs. Ed Hoffschmidt (deceased), Donald M. Simmons, and Jimbo Terushi contributed original drawings for this book. Peter Labbett and Herbert Woodend contributed their research talents and historical insights to this undertaking, especially as it applied to the British and European handgun scene. Markku Palokangas prepared the basic material for the chapter describing the Finnish handguns. In addition to these individuals, the following people (listed in alphabetical order) also added in their own special way to the writing of *Handguns of the World*

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- Star Bonifacio Echeverria, SA

Switzerland
- Eidgenossische Waffenfabrik, Bern
  - H. Ditesheim
- Schweizerische Industrie Gesellschaft, Neuhausen am Rheinfalls

Union of Soviet Socialist Republics
- Embassy of the USSR, Washington, DC
- Voenno-Istoritskogo Muzeya Artilleryii, Inzhenernikh Voisk i Voisk Svyazi (Military Historical Museum of the Artillery, Engineer and Signal Services), Leningrad

United States of America
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- Kent Spaulding
- US Army Aberdeen Proving Ground
- US Army Armament Materiel Readiness Command
  - Robert H. Bouilly
  - Grenville King
  - Richard Maguire
- US Army Armament Research and Development Command
  - LTC Robert D. Whittington
- US Army Foreign Science and Technology Center
  - R. T. Huntington
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  - Richard Seabrook
  - Joseph E. Smith (deceased)
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My debt to the earlier researchers into the history of military handguns is outlined in the notes following each of the chapters. Without the work of earlier students and collectors this book would have been impossible. As is always the case, any errors of fact or interpretation are the sole responsibility of the author. Individuals with criticisms or corrections are encouraged to write to the author. In so doing remember that I have tried to prepare a useful book for all, and remember that such mistakes are the inevitable price of undertaking such a large-scale enterprise.

Finally, my wife, Linda Neuman Ezell, deserves a special word of thanks. This is the fifth book we have worked on together during the past seven years. She has helped in the research phase, copying materials from documents in the archives of several countries: she edited and typed the complete manuscript; all of this while she also was working on a book of her own. For the most part she kept calm, kept me calm, and encouraged me at times when the project promised to overwhelm.

1 THE MILITARY HANDGUN, 1350–1870

In concentrating on pistols and revolvers built since 1870, this book begins midstream. Military forces had been using one-handed guns for five centuries before 1870. During those first 500 years, progress was slow in developing a satisfactory handgun, but by the mid-nineteenth century the pace of technological improvements began to accelerate. Military personnel began to favor percussion, front-loading revolvers over single-shot muzzle-loaders, which used black powder as a propellant and spherical lead balls for projectiles. Between 1870 and 1914, the breech-loading center-fire revolver with its self-contained cartridge was challenged for its place as a military handgun by numerous self-loading pistol designs. Black powder had been supplanted by smokeless powder, and lead projectiles were giving way to round-nosed cylindrical bullets with full metal jackets. Improvements in manufacturing techniques and enhanced metallurgical knowledge made possible the series production of large quantities of durable, reliable combat handguns. But the handgun as it was known in the nineteenth century evolved from fourteenth century weapons.

FIGURE 1–1. Fourteenth century hana cannon after a drawing in the English Burney manuscript number 169, folio 127, dated 1469. (*U.S. Army*)

EARLY HAND CANNONS

The first hand cannons, which appeared around the middle of the fourteenth century, were neither portable nor reliable compared to handguns of the nineteenth and twentieth centuries. Yet these hand-held firearms represented a first step toward the invention of guns designed to be fired with one hand. The earliest hand cannons were short tubes of either cast bronze or wrought iron. At first, the cannon were made with a touchhole, which permitted application of a glowing ember or some smoldering tinder to ignite the black gunpowder. Evidence indicates that early hand cannons were clumsy, two-handed weapons, and most required a wooden pole, called a tiller or haft, to help aim the gun and control it. By the mid-fourteenth century, however, smaller guns were be-

FIGURE 1–2. Fourteenth century gunner firing a semi-portable hand cannon. (*Greener*)

FIGURE 1–3. A late fourteenth or early fifteenth century mounted hand-cannon gunner. This was the first step toward a gun powder weapon for the cavalryman (*Greener*)

coming increasingly popular.[1] In 1364, the town government of Perugia, on the Italian peninsula, ordered 500 hand cannons, each to be no longer than the palm of a person's hand ("500 bombards of a span in length, which can be carried in the hand").[2] These early hand firearms were made in a variety of sizes, shapes, and bore diameters. Swedish examples dating from the late 1300s range in length from 193 millimeters (bronze hand cannon from Mörkö) to 300 millimeters (bronze hand cannon from Loshult). The wrought-iron hand cannon found at Tannenberg castle in Hesse was about 320 millimeters long, with a muzzle bore diameter of 17.5 millimeters. It was fabricated before 1399, the year the castle was destroyed during a siege.

Clearly, the fourteenth century pistol—the word "pistol" was possibly derived from the Bohemian *pist'ala* or from the Italian *pistoia*—was not a handgun as we define it today. The length of the tiller depended on the length of the barrel, with the rudimentary stock averaging about one meter long. The hand cannon was the common ancestor of the handgun and the shoulder-fired weapon, and many years passed before a clear differentiation was made. Although, they followed separate but related paths of development, the handgun and the shoulder-fired weapon shared a common objective: defeating the enemy.

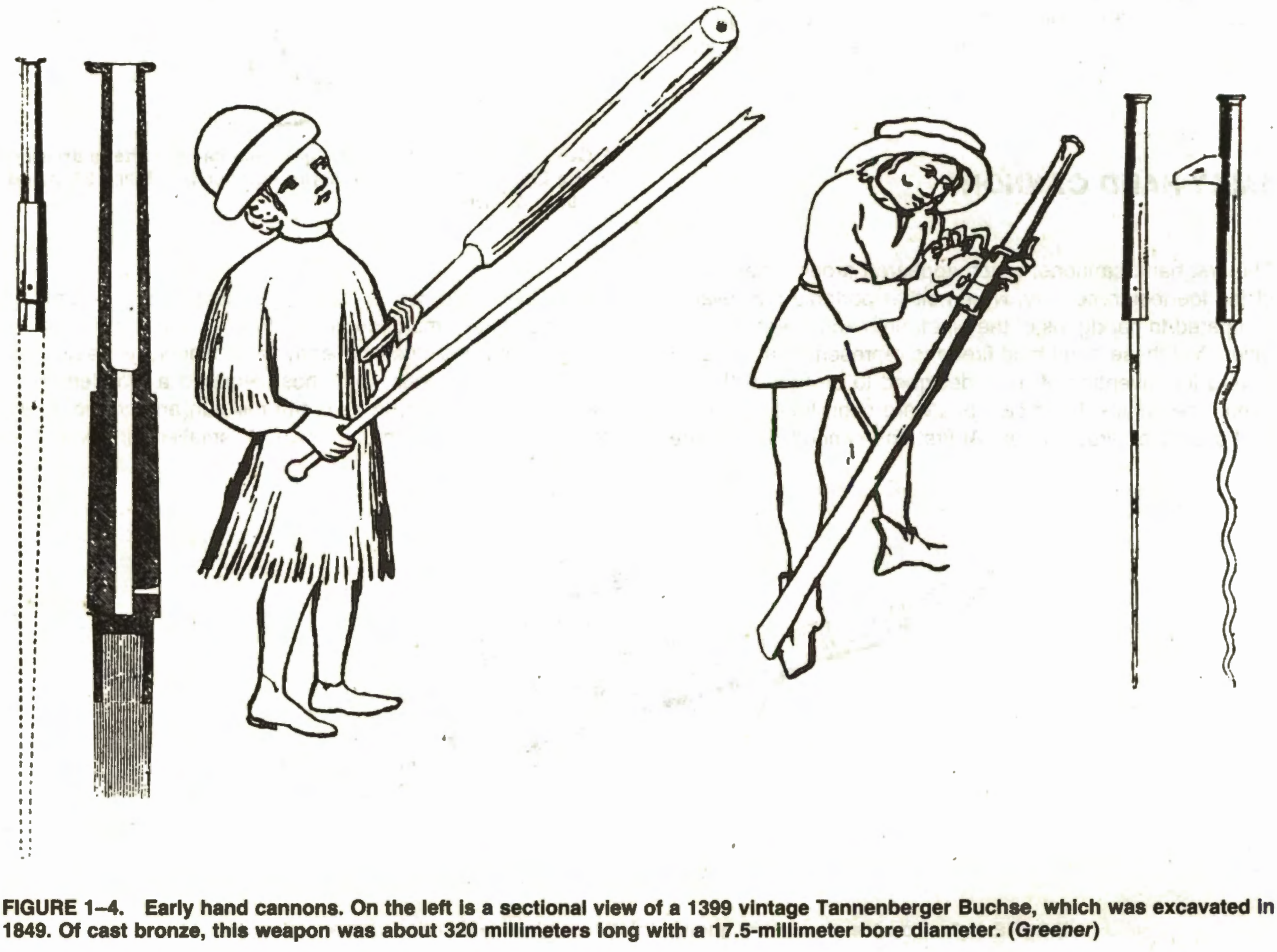


FIGURE 1–4. Early hand cannons. On the left is a sectional view of a 1399 vintage Tannenberger Buchse, which was excavated in 1849. Of cast bronze, this weapon was about 320 millimeters long with a 17.5-millimeter bore diameter. (*Greener*)

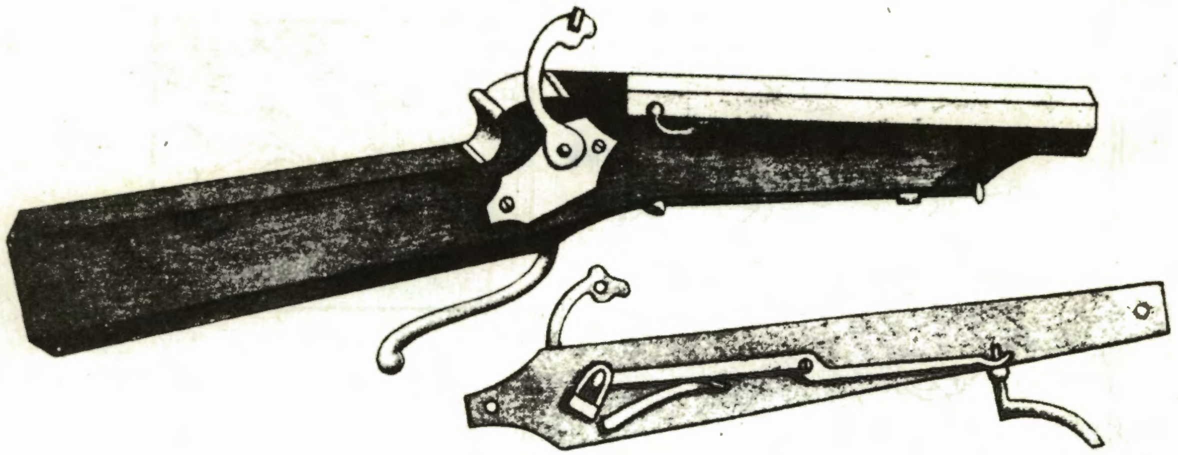


FIGURE 1–5. The matchlock of Martin Merz as illustrated in the "Codex Germanicus 599" of 1475. This lock design brought the burning match forward and away from the shooter's eye, thus making aiming easier and safer. (*U.S. Army*)

IGNITION METHODS

Historian Claude Blair notes that development of a true pistol, a one-handed gun, was inhibited by two factors:

1. Firearms were regarded essentially as infantry weapons to be used *en masse*. Various attempts to arm horsemen with firearms are recorded during the later Middle Ages, but these appear to have been intended to function as mounted infantry. There was therefore no known tactical reason for the development of a pistol.
2. No purely mechanical system of ignition existed.[3]

The absence of a reliable ignition mechanism for handguns was probably the more important delaying factor. One can imagine the difficulties faced by heavily armored, mounted knights when they attempted to fire hand cannons. Holding and aiming the weapon with one hand, the horseman had to hold the reins in the other and apply the source of ignition, embers or match, to the gun's touchhole; not an easy task. Doubtless, it made more sense to gallop up to the enemy, dismount, and then wrestle with an awkward gun. An effective cavalry side arm by definition must be ready for instant use.

The Matchlock

By the early decades of the fifteenth century, hand cannon makers had created the matchlock, which simplified ignition. This development was especially significant because firing a weapon with only one hand was now possible. The slow-burning match—rope treated with saltpeter—was held by a piece of metal called the serpentine. In its most rudimentary form, the serpentine was simply a curved hook, which was pulled down into the flashpan to fire the gun. During the fifteenth century, the matchlock became progessively more complicated, but its reliability still depended largely on the uncertain burning of the match.[4]

Matchlocks gained popularity in the sixteenth century as infantry weapons. England's Henry VIII, who reigned from 1509 to 1547, brought Flemish gun makers to England so he could have a readily-available, domestic source of firearms. During Henry's reign, many of his cavalrymen were armed with matchlock pistols. Craftsmen, experimenting with the basic matchlock, tried to improve it. One gunmaker attempted to produce a three-barrel revolving gun with each barrel having a separate flashpan complete with sliding pan cover to prevent the loss of priming powder. To fire this weapon, the shooter aligned the barrel so that the serpentine lowered the match to the pan, the cover slid forward, the trigger pulled to lower the burning match, and the weapon was fired. It was crude, but it was an idea that would be seen again in a more refined state. Other artisans, meanwhile, sought a more reliable, weatherproof means of ignition—the *wheel lock*.

The Wheel Lock

Technologically, the wheel lock was very advanced, and it was militarily significant. The principle was simple: spin a serrated steel wheel against a material that would produce sparks. Those sparks directed into a pan of priming powder would set off the main charge, sending the projectile on its way. As it evolved, the wheel lock consisted of a lock plate with a pan attached to its upper surface. The bottom of the pan had a slot through which the vertical wheel projected. A spindle, which served as the axle for the wheel, was attached to a link chain that in turn was connected to a **v**-shaped mainspring. A sear was used to hold the wheel in the "wound" position. When the trigger was pulled, it released by mechanical linkage the sear; the wheel rotated, and sparks were produced by the friction between the wheel and the pyrites held in the jaws of the cock.

The origin of the wheel lock, along with a good many other design elements of firearms, is shrouded in uncertainty. Johann Kiefuss (or Kühfuss), a clockmaker from Nuremberg, is traditionally credited with originating the wheel-lock mechanism between about 1515 and 1517. Recent research has made a case for Leonardo da Vinci as the inventor. Da Vinci

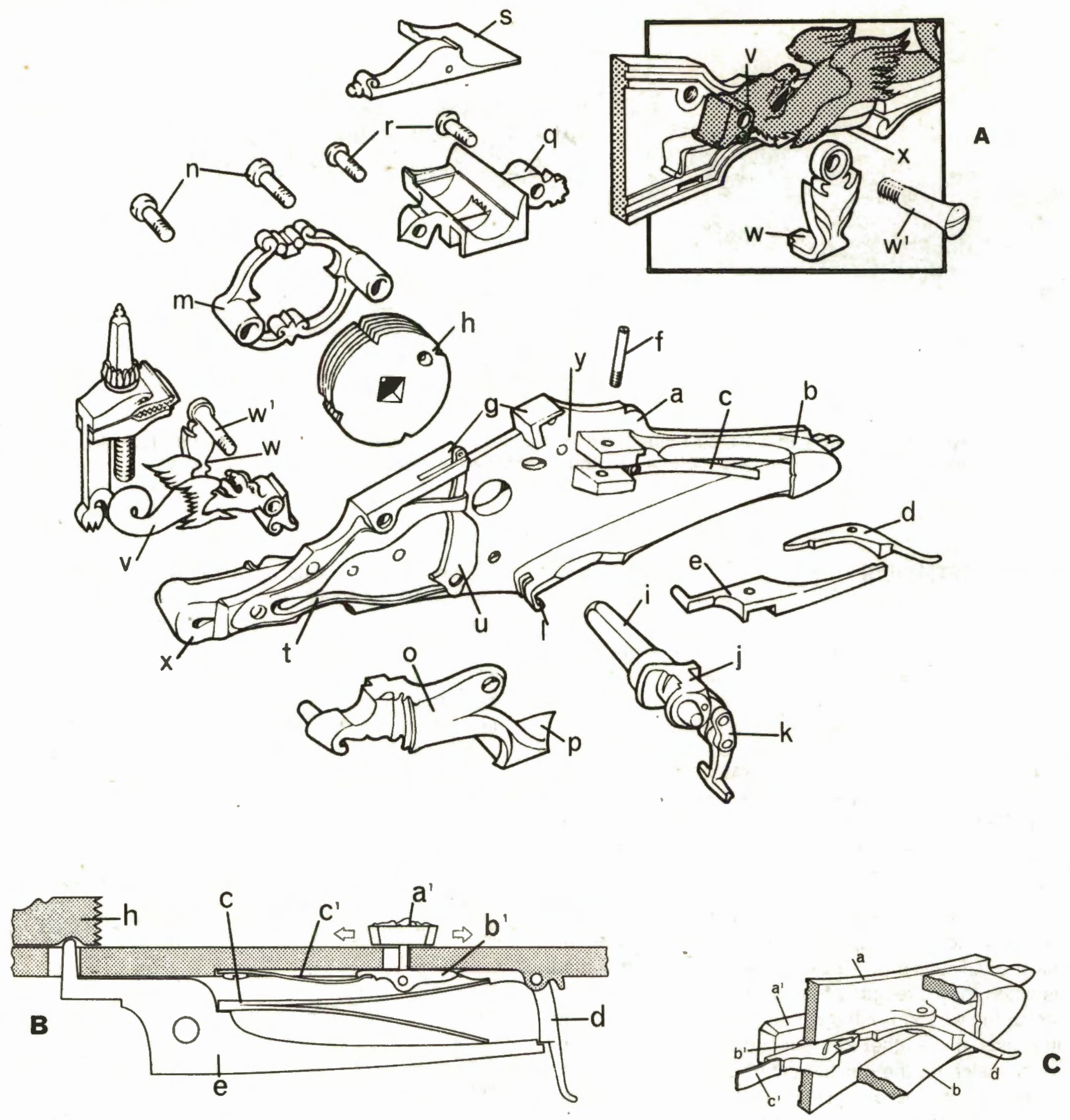


FIGURE 1–6. The Standard Wheel lock. (from Claude Blair: *Pistols of the World*)

a Lock plate
b Mainspring
c Sear spring
d Trigger level
e Sear level
f Sear pivot pin securing sear lever to *y*
g Shoulders on which the pan *q* is supported
h Wheel with square hole for the spindle *i* and a circular recess in which the nose of the sear *e* engages
i Wheel spindle
j Portion of *i* round which the transmission chain *k* winds. To the left is the cam that opens the pan cover automatically as the wheel unwinds by striking the lever *u*
k. Transmission chain terminating in a toggle that engages with the mainspring at *l*
l End of mainspring shaped to receive the toggle on *k*
m Ring-shaped wheel cover
n Screws for attaching *m* to the lock plate
o Bridle supporting the inner end of the wheel spindle *i* with mainspring stop at *p*
p Mainspring stop on *o*
q Pan, slotted for the wheel and the edge of the lock plate to which it is attached at *g*
r Retaining screws for *q*
s Sliding pan cover pivoted to the top of *u*
t Pan cover spring
u Pan cover arm, pivoted at the bottom
v Cock, the neck chiselled in the form of a wyvern. The lower jaw of the dog-head is movable
w Cock bridle
w^1 Cock pivot screw
x Cock spring
y Lugs between which the sear lever is pivoted. The upper one also serves to secure the end of the mainspring
a^1 External knob of sliding safety catch
b^1 Safety catch lever which engages over the toe of the trigger lever *d*
c^1 Safety catch spring

A shows the method of attaching the cock. B and C show the sear and safety mechanisms. (Based on early seventeenth-century German lock 124-1897 in the Victoria and Albert Museum)

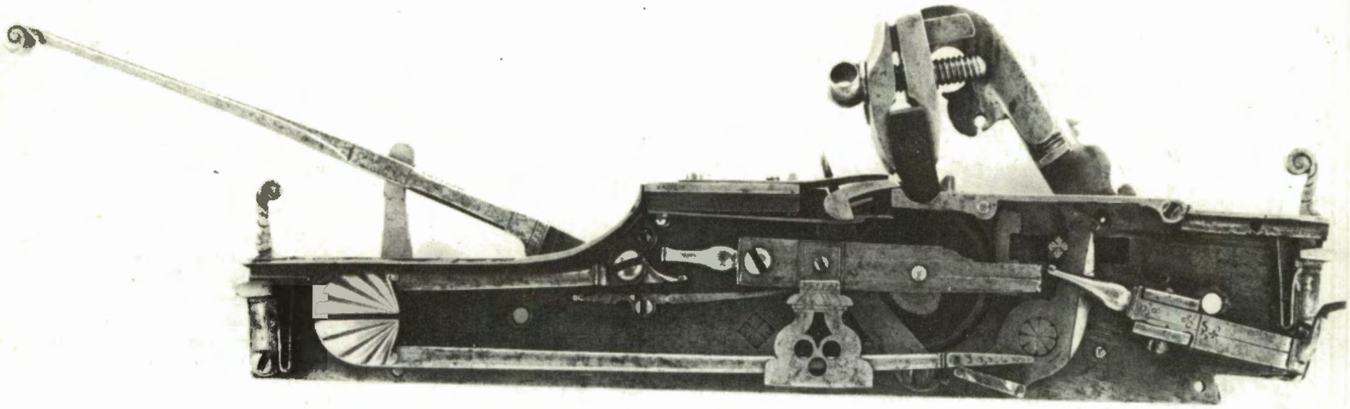


FIGURE 1–7. Seventeenth century lock mechanism from a German wheel lock firearm. (*Smithsonian*)

was deeply interested in weapons for the horseman, and a manuscript drawing by him dated 1493 illustrates a wheel-lock-type mechanism. It also is plausible that the rotary cutters used to make wheel-lock parts and other precision components may have evolved from gunmaking rather than clock-making as previously was believed.[5] Whatever the source of the idea, the wheel lock was very important to the military.

Wheel-lock weapons had several advantages over matchlocks. Most obvious was the elimination of the glowing, smoking match. Without the match the gunner was less conspicuous on the battlefield. Second, the lock time was faster. When the trigger was pulled, the serpentine with pyrites or flint in its jaws was brought down toward the wheel, which was permitted to rotate at the proper moment by the lock mechanism. Pyrites or flint against the steel produced sparks that ignited the powder charge. Such a weapon could be stored loaded for an indefinite period before use. Wheel-lock pistols were probably in existence by 1518. In 1544, at the battle of Renty, German knights rode against troops of King Henry II of France (who reigned from 1547 to 1559) carrying all-steel wheel-lock pistols in holsters slung across the pommels of their saddles. They charged the French horsemen, and rank after rank discharged their wheel locks into the mass of enemy cavalry, with each rank making half-turns away to reload. So effective was this maneuver that it was subsequently adopted by the French and called caracole.

Wheel-lock cavalry carbines and pistols were widely used during the Thirty Years' War (1618–1648). By mid-century, the pistol had emerged as a basic cavalry weapon. They came in many different forms, often combined with swords, battle axes, or crossbows. The wheel-lock shoulder weapon never became a standard infantry weapon, however. The complicated, delicate, and expensive wheel-lock mechanism made such shoulder arms unsuitable for issue to large numbers of ground troops. A cheaper, simpler, and more durable ignition system was needed.

The Snaphance

In the mid-1500s, such a mechanism was invented. The first of these spark-producing locks was called snaphance, or snap locks. These locks were essentially an adaptation of the matchlock mechanism, but the match-holding serpentine was replaced by a cock, which had jaws like those on the

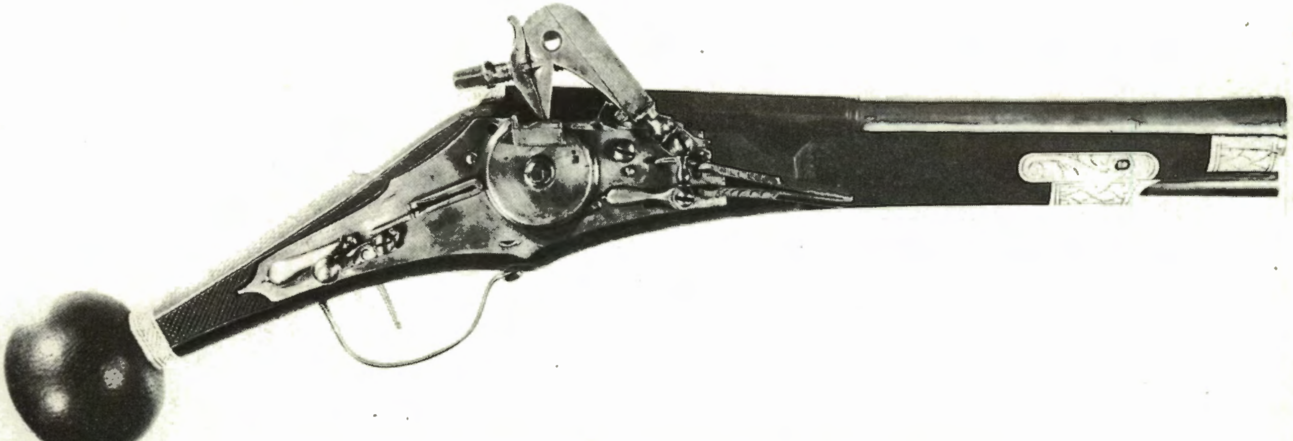


FIGURE 1–8. A typical German military wheel lock pistol. (*Smithsonian*)

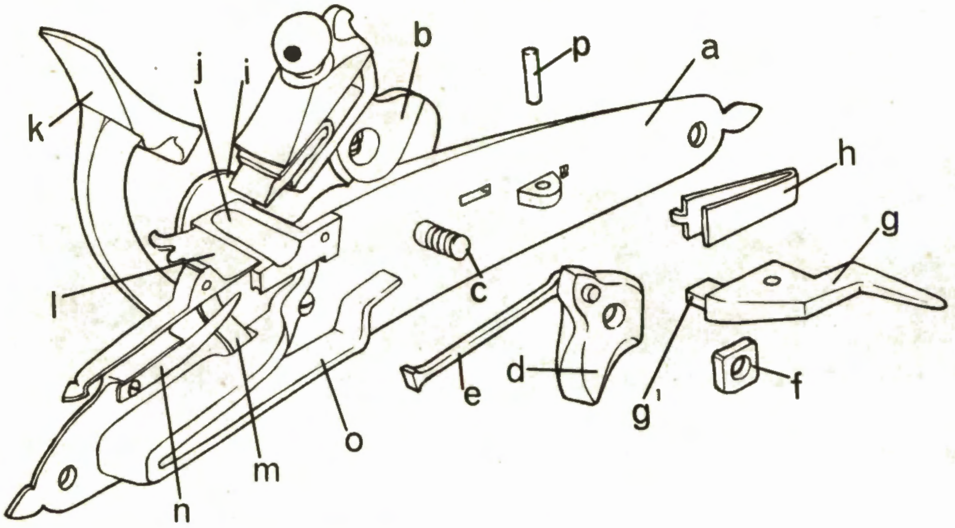


FIGURE 1–9. **The Spanish Miquelet. (from Claude Blair: *Pistols of the World*)**

a Lock plate
b Cock with toe to engage sears *c* and *d* and heel to act against mainspring *h*
c Full cock sear lever with retaining screw *c*
d Half cock held by vertical pivot to the sear lever. Pressure on the trigger lever *e* causes this last to move out, so withdrawing the sear. At the same time the lug on the upper edge of the sear lever presses the end of the full cock sear lever *c* back, so withdrawing its sear
e Trigger lever
f Bracket, screwed to the lock plate, to which the half cock sear lever is pivoted
g Retaining screw for *f*
h Mainspring
i Cock bridle
j Cock pivot screw
k Pan, secured by pin *k*[1] and screw *n*
l Combined steel and pan cover
m Bridle for *l*
n Pivot screw for *l*, also serving to retain the forward end of *m*

(Based on a lock of 1790 in the Victoria and Albert Museum (No. M.714-1927)
N.B. The lock is viewed from the outside, all parts of the mechanism except *c,d,e,f* and *g* being mounted externally

a Lock plate
b Cock
c Cock pivot-screw, secured by the nut *f*
d Tumbler
e Arm, pivoted to the tumbler *d* which pushes against the arm of the pan cover *m* and opens the latter as the cock falls
f Retaining nut for the cock pivot-screw *c*
g Combined sear and trigger lever, pivoted to the bracket below the pin *p*. The sear works through the lock plate and engages over the heel of the cock at full cock
h Trigger or sear spring
i Circular fence on the outside of the pan *j*
j Pan
k Steel
l Sliding pan cover pivoted to the arm *m*
m Pan cover arm
n Pan cover spring
o Mainspring
p Pin on which the sear lever *g* is pivoted to the bracket immediately below

The feather spring for the steel is concealed on the drawing behind the lock plate
(Based on the lock of a Scottish gun, dated 1690, in the Tower of London Armouries (No. XII.65)

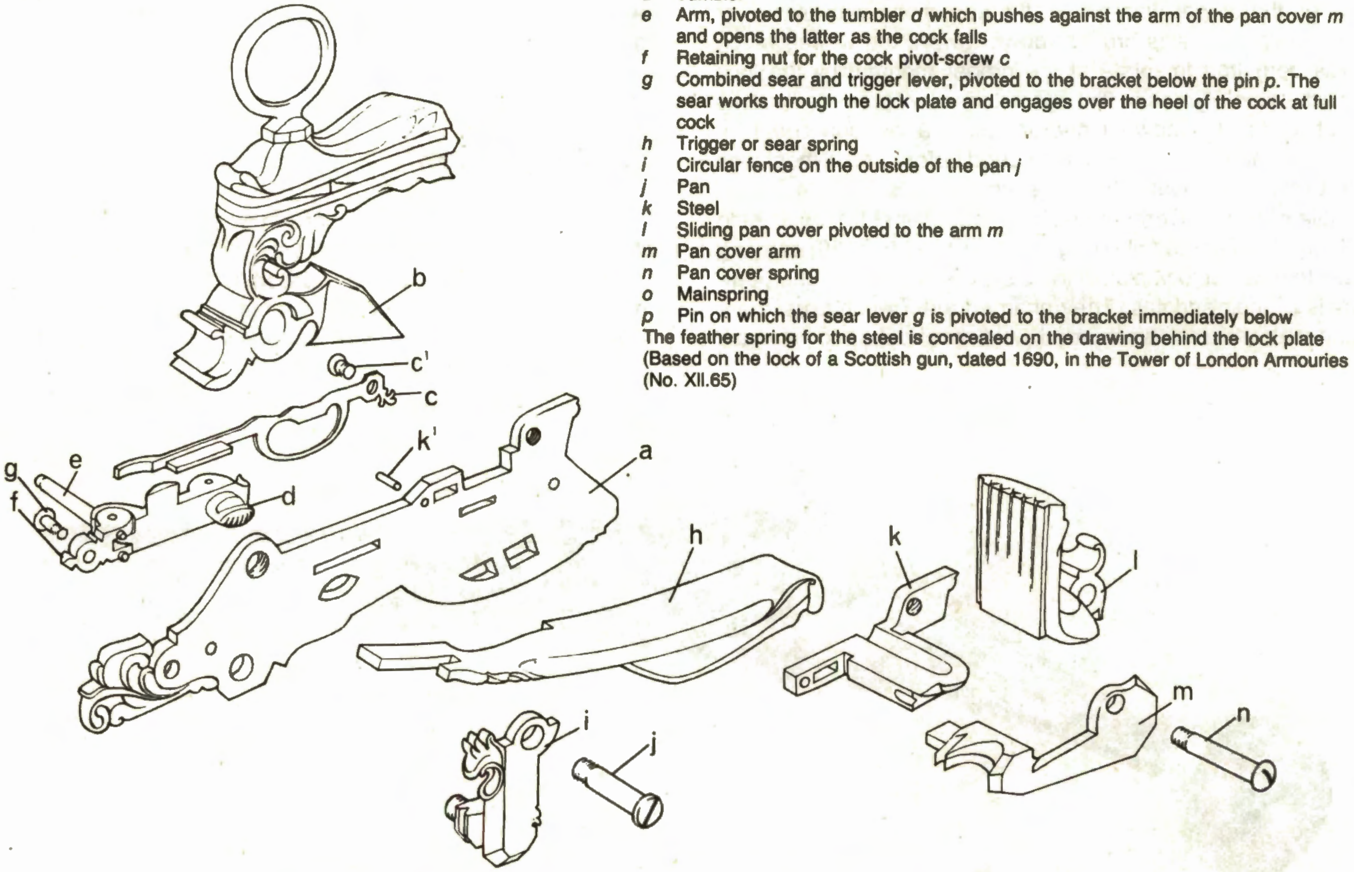


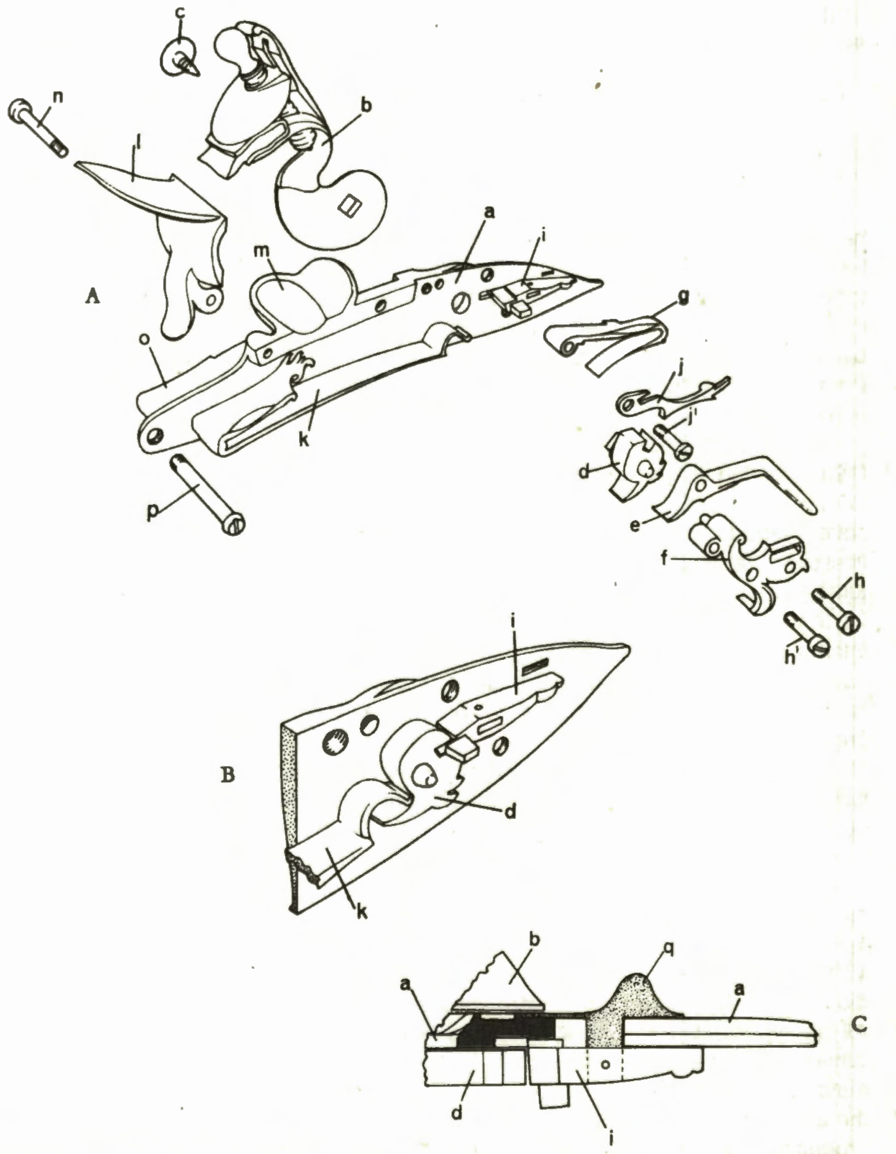
FIGURE 1–10. **The Snaphance. (from Claude Blair: *Pistols of the World*)**

wheel-lock cock. A piece of steel on a hinged arm was positioned over the flashpan. This striking surface supplanted the turning wheel of the wheel lock, thereby eliminating the complicated interior mechanism required to rotate the wheel. A piece of pyrite was fastened in the jaws of the cock, and when the trigger was pulled the sear that held the cock in the ready position (that is, held it cocked) was withdrawn from its recess in the cock. Thus permitted to rotate forward, the cock continued to move until the pyrites struck the steel positioned over the flashpan. The resulting sparks ignited the gunpowder charge in the barrel.

Simpler and less costly than wheel locks, these snap locks were produced in significant numbers in the last quarter of the sixteenth century. By the 1580s, national styles, became discernable. German locks as early as 1570 had an internal mainspring operating on a tumbler, which was attached to the cock pivot. The cock arm could hold either pyrites or flint in its jaws, and the pan was often fitted with a sliding cover, which was opened automatically by the motion of the falling cock. In Italy, a snaphance lock with an external spring that operated on the toe of the cock was in general use as late as the mid-seventeenth century. Generally called the "Roman lock," this type of lock is often grouped with similar Spanish locks under the name *miquelet*. In Spanish locks, the mainspring usually pressed down on the heel of the cock. Pyrites, flint, and steel locks were used on both shoulder weapons and handguns. Generally, the major difference lay in their size, with pistol locks being smaller. The locks could be extremely ornate or of very simple design.

The Flintlock

The next noteworthy advance was the true flintlock. Basically operating like the snaphance, the flintlock had a different style of steel-striking surface against which the flint could act. An **L**-shaped hinged piece (variously designated *batterie* or *frizzen*) covered the flashpan. The horizontal foot of the **L** was



a Lock plate
b Cock
c Cock screw, fitting into the squared end of the tumbler *d*
d Tumbler. The projecting toe engages under the tip of the mainspring *k*. The three notches, commencing at the top, are for the safety catch bolt *i*, and for giving full and half cock respectively on the sear *e*
e Sear and trigger lever
f Bridle supporting the tumbler and the sear lever
g Sear or trigger spring
h, h^1 Screws for attaching *f* to the lock plate
i Sliding safety catch bolt
j Safety catch spring
j^1 Screw for attaching *j* to the lock plate
k Mainspring
l Steel and pan cover
m Pan
n Pivot screw for the steel and pan cover
o Feather spring for steel and pan cover
p Front screw for attaching lock to stock
q External knob of safety catch
(Based on the lock of a gun of c. 1740 by Griffin of London, in the Victoria and Albert Museum (No. 128-1878)

FIGURE 1–11. The Flintlock. (from Claude Blair: *Pistols of the World*)

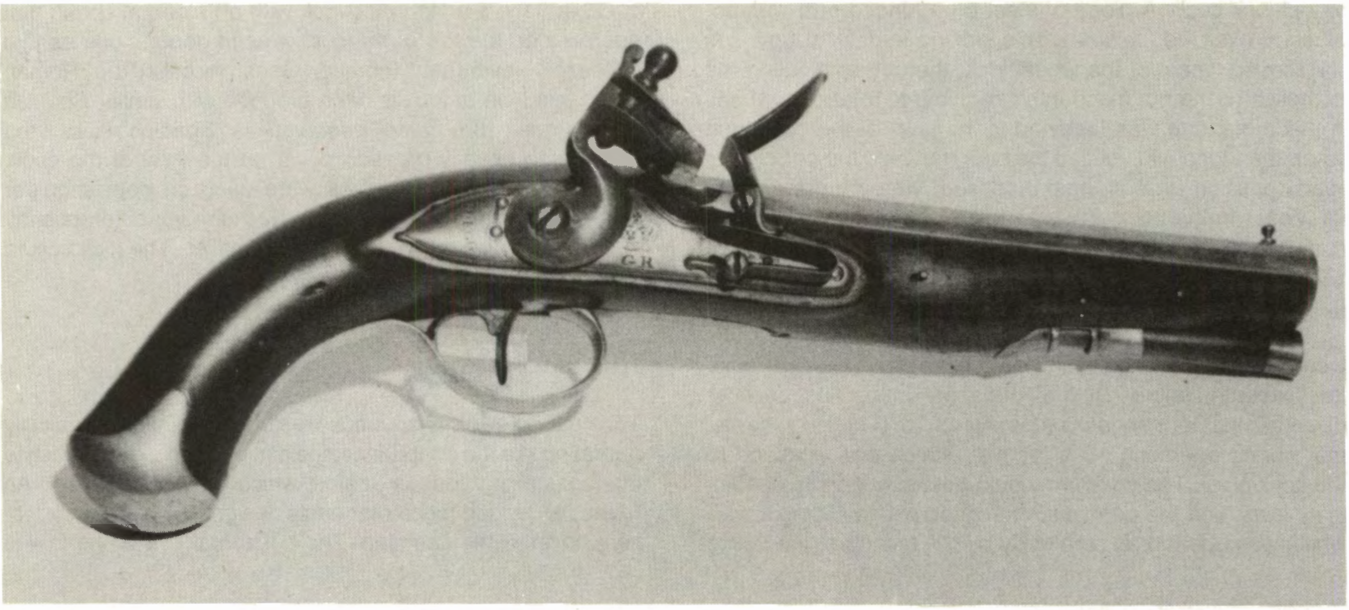


FIGURE 1–12. British military flintlock pistol, Phillip d'Auvergene pattern, made by Durs Egg during the second half of the eighteenth century. (*Smithsonian*)

hinged at the toe. As the cock fell, the flint would strike the back side of this **L**-shaped piece. This downward blow would throw the hinged **L** forward, thus exposing the priming powder in the flashpan. Simultaneously, the flint scraping along the back of the **L** showered sparks down into the pan. The step from snaphance to flintlock further simplified the lock mechanism.

Torsten Lenk in his classic study of the flintlock, *Flintlåset* (1939), limited the use of the term flintlock to mean a specific form of snaphance. That type of lock has the steel and pan cover made from one piece as described above, with a vertical sear that engages at different stages two notches in the tumbler to provide a half-cock (safety) and cocked position for the cock. The tumbler inside the lock is attached to the interior end of the cock spindle. Although this distinction is useful for the study of locks, Claude Blair points out that it is anachronistic: "there can be no doubt that during the greater part of the seventeenth century this form of lock was still called *snaphance* or *fusil*."[6] When and where the "true flintlock first emerged is still uncertain. Recent research suggests that a date between 1595 and 1620 is probably a reasonable one."[7] France was likely the country of origin.

The chronology of lock development can be summarized as follows: matchlock, ca. 1410–1415; wheel lock, ca. 1490–1495; snaphance, ca. 1540–1545; and flintlock, ca. 1595–1620. Introduction of a new lock mechanism, of course, did not mean that older forms were immediately abandoned. All four types of locks in many variations existed side by side. Wheel locks were used until the eighteenth century, and matchlocks persisted in Europe into the early decades of the eighteenth century. Wheel lock and snaphance firearms production continued long after the flintlock had established its place in military armories in Europe and America.

Percussion Lock

Once established, the military flintlock stayed in use for two centuries until the percussion lock took its place. This newest system involved the use of a chemical detonating compound in place of the loose priming powder in the flashpan. The detonating powders were crushed beneath the blow of a striker, or hammer, producing the igniting flash previously provided by the flint and steel and priming powder system. Several Germans, including Johann von Lowenstern, had been experimenting with detonating compounds (fulminates) in the late seventeenth century. Nicholas Lemery reported on his experiments in the proceedings of the Royal Academy of Sciences in 1712 and 1714. Louis XV's chief army physician, Dr. Bayen, commented on the explosive properties of the fulminate of mercury, but did not see any practical applications for the compound. Claude Louis Berthollet began experimenting with detonating compounds in the mid-1780s, injuring himself when the ultra-sensitive silver-fulminate he was working with exploded. Whereas Berthollet was seeking a replacement for black powder, it was Edward Charles Howard, an Englishman, who saw the potential of using a fulminate as an ignition material. In 1799, Howard produced a mixture of fulminate of mercury and saltpeter. He modestly called his invention "Howard's Powder."

The Reverend Alexander John Forsyth (1768–1843), minister of Belhelvie, Aberdeenshire for 52 years, was the man who first successfully wedded fulminates to the ignition of firearms. After several years of experimentation, Forsyth completed his first satisfactory percussion lock in 1805. His work was brought to the attention of Lord Moira, the master general of ordnance, which led to Forsyth carrying on his work on a new ignition system at the Ordnance Office, quar-

tered at the Tower of London. Forsyth patented his invention on 11 April 1807 (patent 3032).[8]

Forsyth's first commercially successful lock was the scent bottle type, which he placed on the market in 1808. A metal container the shape of a scent bottle on the side of the lock held the priming or detonator compound. Starting with a flintlock kind of lock mechanism, Forsyth substituted a striking head for the flint jaws on the cock. A tapered steel plug was screwed into the barrel in about the same position as the old flintlock touchhole. In the top of that plug there was cut a tiny pan; a channel ran from the pan down the plug into the barrel. It was through that channel that the igniting flash was transmitted. A hole in the center of the scent bottle fit over the plug so that the detonator magazine could be rotated. When the bottom part was rotated to the *up* position, enough detonator powder to fill the pan was released. When rotated to the *firing* position—detonator compound storage pointing down—the striker mechanism was positioned above the flashpan. Upon pulling the trigger, the hammer (cock) fell, driving the striker downward. This force crushed the fulminate compound against the flashpan. The ensuing detonation sent a flash down the channel to fire the weapon.

Subsequent inventors sought to simplify the lock mechanism by using loose or pellet detonating powder. By 1830, the percussion cap was the generally accepted system for igniting firearms powder charges. The cap was placed on a steel tube (nipple) screwed into the breech of the weapon. A small channel communicated the flash from the cap to the powder chamber. In its final form, the percussion hammer had a hollow nose that came down over the percussion cap to eliminate the danger of flying copper when the cap was detonated. One of the advantages of the percussion system was the ease with which it could be adapted to existing muskets and pistols.

SHEET-MADE WEAPONS

Before turning to the origin and development of revolving arms, some remarks should be made about the manufacture of small arms at the beginning of the nineteenth century. Until the late eighteenth century, nearly all firearms—shoulder arms and handguns—were made as individual pieces. But as armies grew in size, and with them the requirements for large numbers of small arms, there was an increasing demand for standardization of weapon type and the application of machine power to supplement the manpower used in firearms fabrication. In the 1820s, no two small caliber weapons were yet exactly alike, but genuine progress had been made toward the standardization of component parts of firearm locks, the most complicated assembly of guns of the period. Men like Honoré Blanc (d. 1801), creator of the French Modèle 1777 flintlock musket and later *inspecteur general* at three arsenals (Saint-Étienne, Charleville, and Maubeuge), had done much to introduce techniques that assured that lock plates and associated parts were similar to one another. Blanc's goal was to produce muskets economically and with great precision ("*la plus grande èconomie et la précisioin la plus exacte*"). Blanc believed that weapons having locks with interchangeable parts would be easier and far less expensive to repair because the work could be done by relatively unskilled workers rather than by master craftsmen.[9]

Numerous men built upon the work of pioneers such as Blanc. Scholars have now dismissed the "invention" of interchangeable manufacture claimed by partisans of Eli Whitney. In the United States, many individuals—Simeon North, Henry Aston, Marine T. Wickham, John Hall—contributed to the creation of the interchangeable manufacture of components.[10] The availability of interchangeable parts may have been overplayed by historians looking at the history of firearms development, since the examination of American handguns made as late as 1860 indicates that machine-made parts were still not necessarily identical. Interchangeable parts tended to be considerable more expensive than machine-made-but-hand-finished-and-fitted components. As one American historian has noted, "looking at the total record of American arms production, it becomes evident that the use of machine tools was of paramount importance, but the interchangeable part was not achieved to any great measure."[11] Still, the creation of *standard pattern* weapons, the division of labor in the workshops, the use of machine tools, and the employment of gauges to inspect and measure finished parts were major steps forward toward the time when firearms could be assembled with only minor hand fitting and polishing of parts.

The shift from handmade to machine-made was of inestimable significance in the manufacture of modern military handguns. First, production numbers grew from hundreds or thousands of a model to hundreds of thousands or millions. Second, mass productioin of handguns required a level of precision that could only be accomplished by repetitive machine processes. Third, modern selfloading firearms are self-acting internal combustion machines that must be precisely fabricated. And finally, as men created newer and more precise machine tools, their understanding of mechanical relationships necessary for the design of better firearms increased, too. Thus, at each step there was feedback. A new manufacturing technique permitted better weapons; better products often suggested production changes and innovations. The revolving firearm was an example of an idea that had been around for many years, but which became possible only as fabrication techniques matured.

DEVELOPMENT OF THE REVOLVER

As noted earlier, experiments with revolving multibarrel guns stretched back to the matchlock era. Wheel lock revolving cylinder guns (ca. 1595–1600) appear to have been made in modest quantities by German craftsmen. German snaphance revolvers from the same period also survive in small numbers. Flintlock revolvers were made in many European locations throughout the 1600s, but their overall quantities were small when compared with single-shot weapons. All of these firearms were awkward to use. Pre-1800 pistols of a revolving type were long (up to 550 millimeters) and heavy (up to 2.85 kilograms); but more of a problem they had difficulty retaining the priming powder for each chamber of the revolving cylinder.

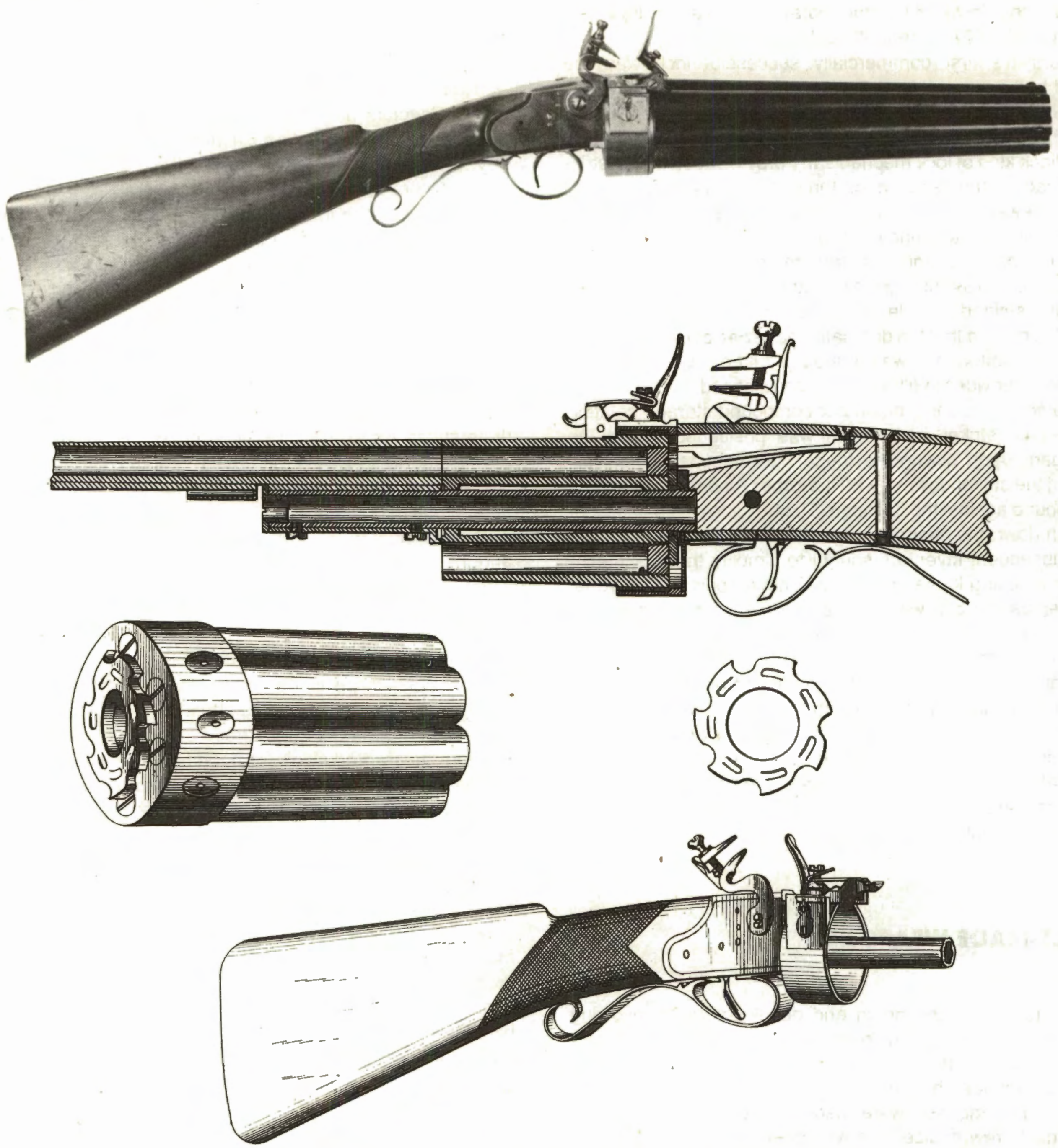


FIGURE 1–13. Captain Artemas Wheeler's revolving, seven-shot, flintlock carbine. (*Smithsonian*)

The Collier-type Revolver A much improved flintlock revolver, often called the Collier revolver, was introduced in 1818. It was the work of three men from Massachusetts—Captain Artemas Wheeler, Concord; Elisha Haydon Collier, Boston; and Cornelius Coolidge, Boston. The patents issued for this design included U. S. patent of 10 June 1818 (patent numbers were not assigned prior to 1836) to Wheeler; British patent 4,315, 24 November 1818 to Collier; and French patent 969, 5 August 1819. Pistols, rifles, and shotguns were manufactured based on this design.

A feature in the Collier-type revolver that distinguished it from all previous revolving arms, and the unique point of the invention was the method of aligning the bore of the cylinder chamber with the bore of the barrel. The mouths of the cham-

FIGURE 1–14. Elisha H. Collier's first revolving flintlock pistol with serial number 1. The cylinder on this pistol must be revolved by hand. The pistol measures 292 millimeters overall, with a 102 millimeter barrel, and a 10.8 millimeter bore diameter. (*Smithsonian*)

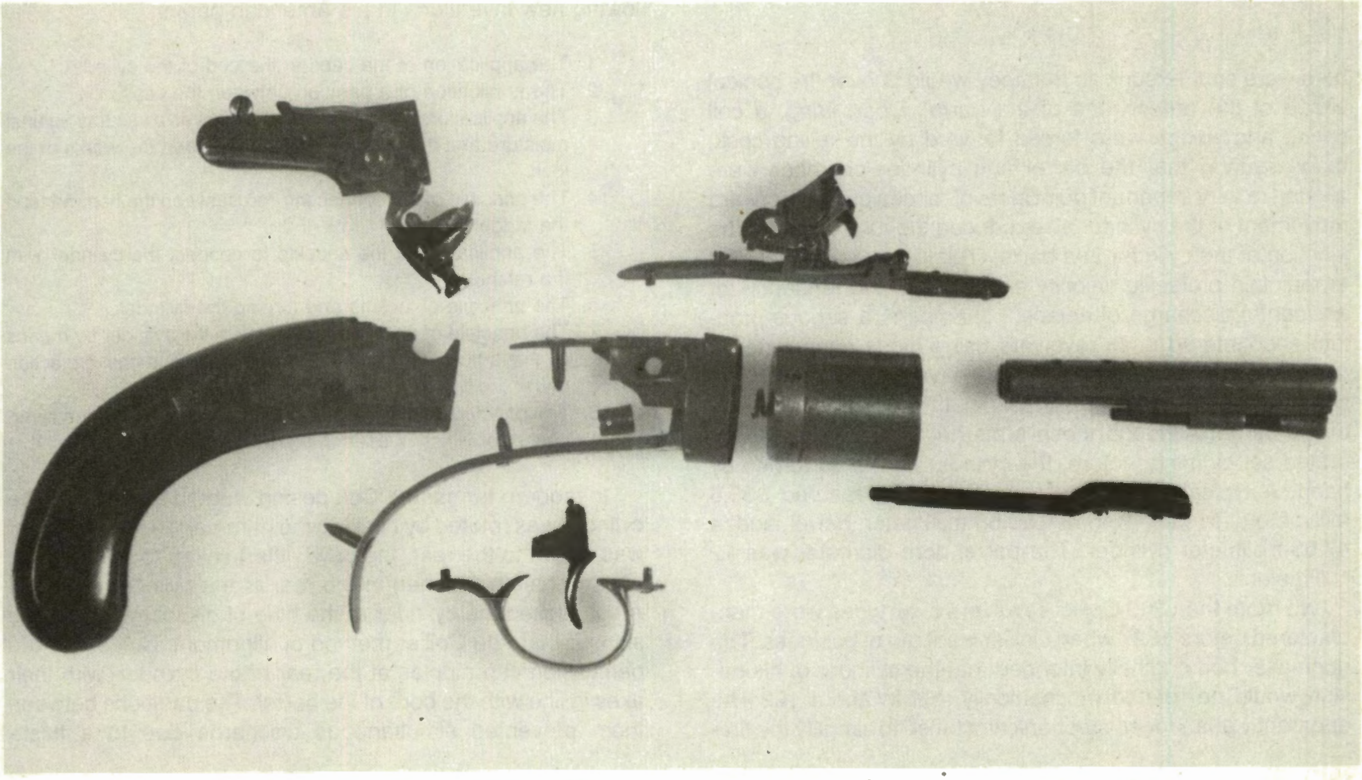


FIGURE 1–15. Disassembled view of Collier's serial number 1 pistol. (*Smithsonian*)

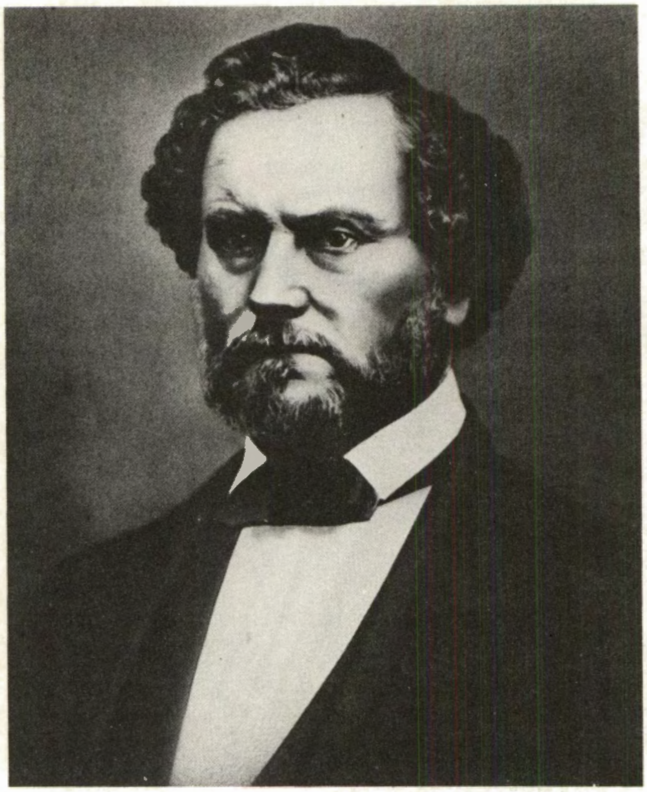


FIGURE 1–16. Samuel Colt (1814–1862) died at the relatively young age of 48 years, but he left a giant imprint on the American and European firearms industry. (*Colt*)

bers were countersunk so that they would fit over the conical shape of the breech end of the barrel. Upon firing, a coil spring and wedge were forced forward by the falling cock, thus assuring that the barrel and cylinder chamber were aligned, a very important point in revolver design. The forward movement of the cylinder also reduced the loss of gas at the junction of the cylinder and barrel. This sealing effect helped to maintain projectile velocity and reduced the tendency for accidental discharge of adjacent chambers, a serious problem encountered in all revolvers using loose gunpowder in the cylinder. Existing Collier pistols have a cylinder with five chambers that revolve on a steel pin affixed to the underside of the barrel. Although these arms had a mechanically operated self-priming feature, the cylinder had to be turned by hand. A typical Collier revolver (No. 89) measured 355.6 millimeters overall, with a 155.58-millimeter barrel and a 47.63-millimeter cylinder. The barrel bore diameter was 12 millimeters.

No more than 300 Collier revolvers of all types were manufactured before 1827 when Collier went out of business. The gunmaker had originally intended that the cylinder of his design would be rotated mechanically, but in about 1824 he apparently abandoned mechanical rotation to simplify the firearm. The Collier revolvers were unsuccessful for two reasons. The guns were expensive to fabricate given existing manufacturing techniques. And they did not exploit the percussion system of ignition. Only a few Collier-type arms were adapted to the newer system of priming. Collier and his colleagues came along at a transitional period, but better designs based on more modern manufacturing processes and percussion priming would survive.[12]

The Impact of Samuel Colt

Samuel Colt (1814–1862) was the first person to successfully solve the revolver problem.[13] Only 21 years old when he applied for an English patent on a percussion revolver, Colt demonstrated considerable sagacity and business sense. He applied for a British patent first because he knew that due to a peculiarity in British patent law a patent in that country would be voided by a prior patent in any other country. Colt's British and French patents did not prohibit him from obtaining an American one for the same invention, however. The multinational patents also indicate that he was intending to go after big sales. American inventors at this period did not usually patent their ideas abroad, but Colt was a marketing person. He wanted military contracts in as many places as possible. With that kind of market in mind, the gunmaker designed his revolver to be made by machine.

Colt was awarded British patent 6,906 on 22 October 1835 and U. S. patent 9,430X on 25 February 1836. Both protected the same fundamental ideas until 1857. He claimed the following new inventions in his American patent:

1. The application of the caps at the end of the cylinder.
2. The application of a partition between the caps.
3. The application of a shield over the caps as a security against moisture and the action of the smoke upon the works of the lock.
4. The principle of the connecting-rod between the hammer and the trigger.
5. The application of the shackle to connect the cylinder with the ratchet.
6. The principle of locking and turning the cylinder.
7. The principle of uniting the barrel with the cylinder by means of the arbor running through the plate and the projection under the barrel.
8. The principle of the adopter and the application of the lever, neither of which is used in pistols.

In modern terms, the Colt design worked as follows. The cylinder was rotated by cocking the hammer.* As the hammer was drawn to the rear, the pawl (lifter) linked to the hammer engaged teeth (ratchet) in the rear of the cylinder to turn it. A bolt locked the cylinder at the time of discharge. This was simpler than the Collier method of alignment. Colt employed percussion cap nipples at the rear of the cylinder, with their axes in line with the bore of the barrel. The partitions between them prevented simultaneous discharge due to a flash-

*Colt's revolvers until 1878 were single-action. Some helpful definitions include: *single-action,* a revolver in which the cylinder is rotated by cocking the hammer; *self-cocking,* a revolver in which the cylinder is rotated and the hammer actuated by pressing the trigger; *double-action,* a revolver that can be operated as either single-action or self-cocking according to need.

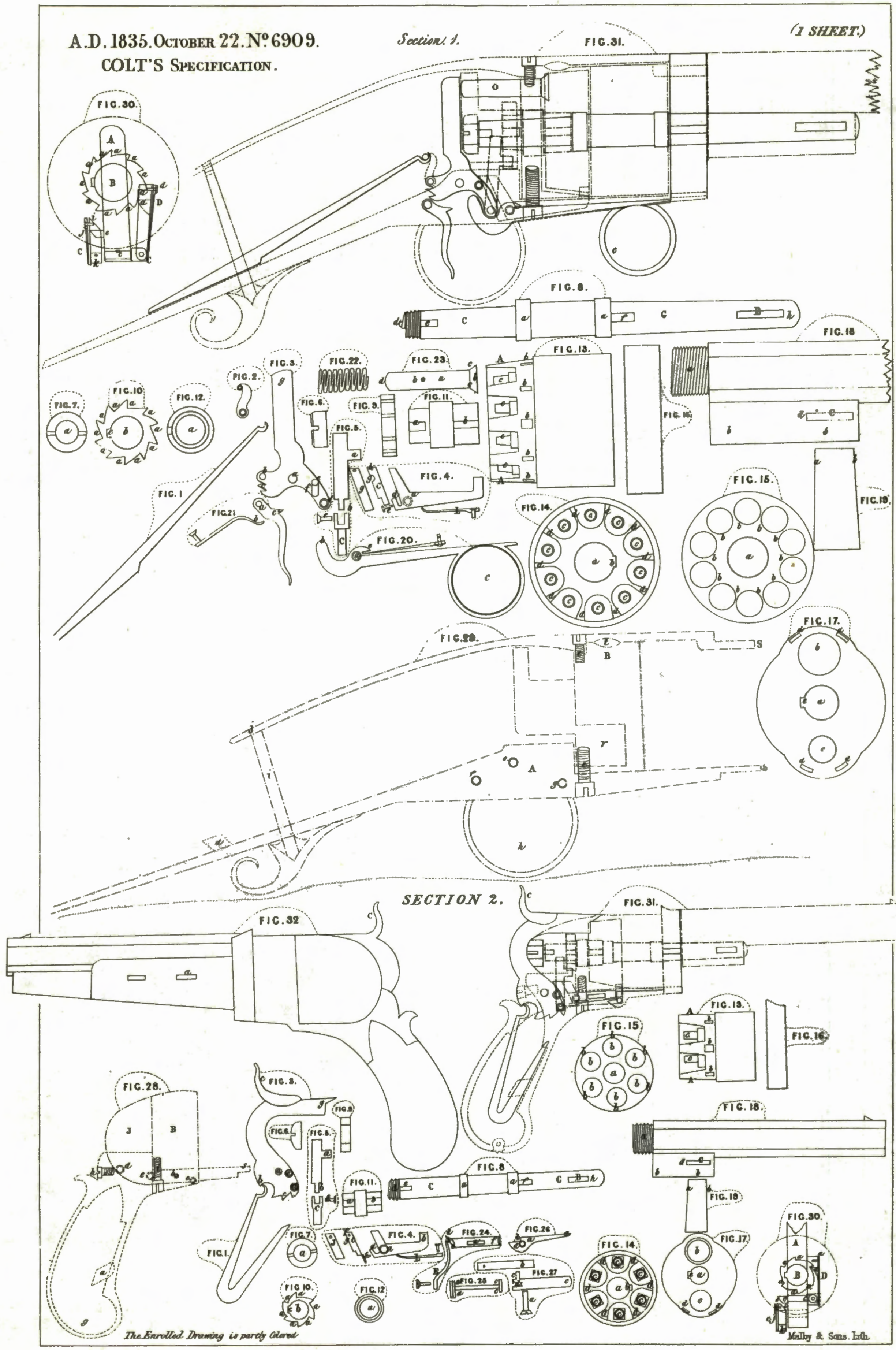


FIGURE 1–17. Samuel Colt's British revolver patent number 6,909, 22 October 1835. (*British Patent Office*)

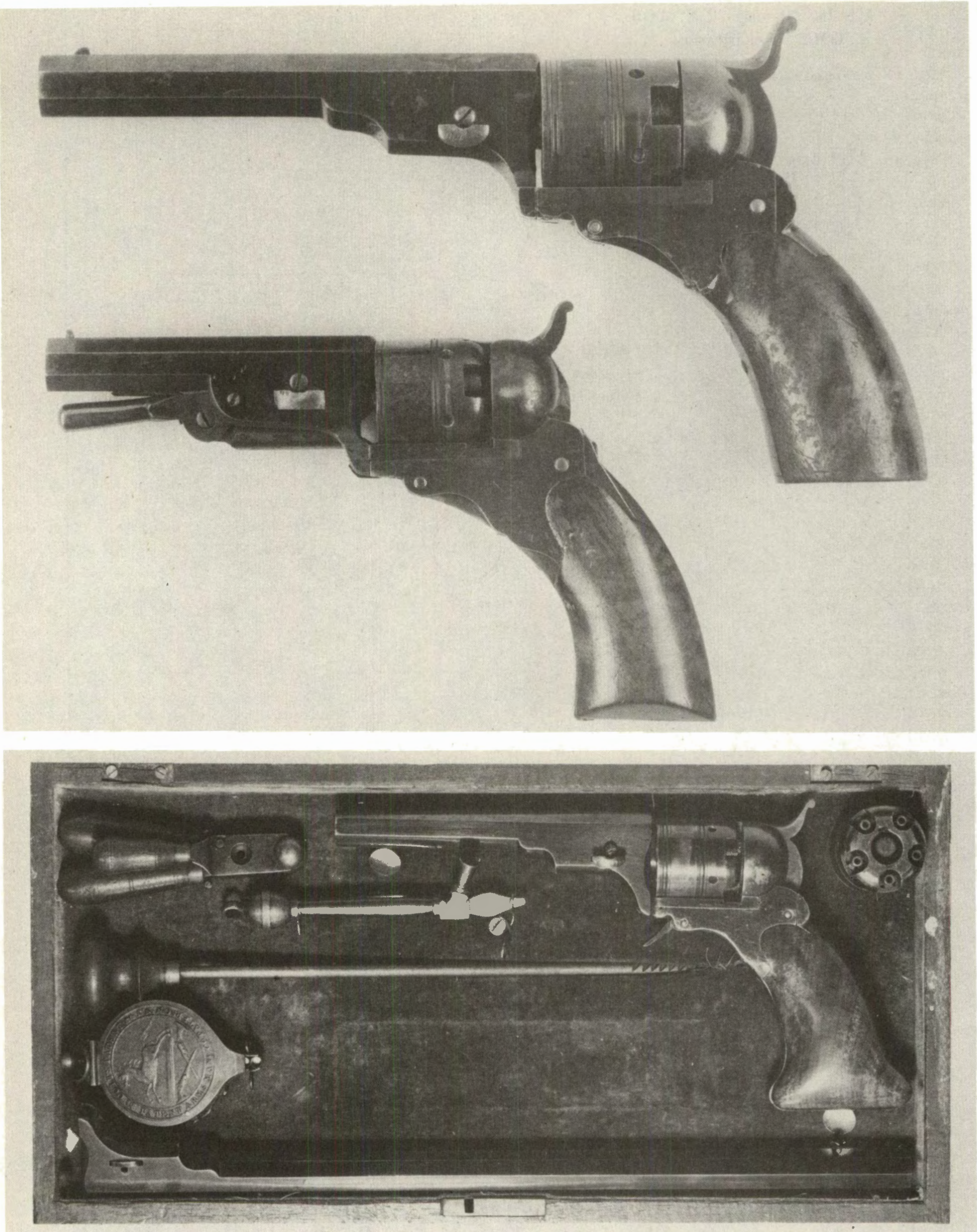


FIGURE 1–18. Three variations of the Colt Paterson percussion revolver. *Top:* .34 caliber (8.6mm) Belt Model with 127mm barrel. *Middle,* .28 caliber (7.1mm) Baby Model with 76mm barrel. The loading lever was installed at the Colt factory. *Bottom,* .36 caliber (9.1mm) Texas Model with 139mm barrel. This revolver weighed about 1,133 grams. (*Colt*)

around. In attaching the barrel of the revolver to the pin around which the cylinder revolved, Colt demonstrated considerable cleverness. That method of connecting the barrel, cylinder, and pistol grip/frame would be employed by the Colt Company for nearly 40 years.

Sam Colt's revolvers were a success, but not an overnight success. To start with, Colt needed money with which to build prototypes, finance his patent applications, and establish a factory. Between 1831 and 1836, he drew on personal and family resources to finance his activities. Dudley Selden, a cousin and lawyer, was given the tasks of incorporating the Patent Arms Manufacturing Company in New Jersey and selling stock to potential investors.

Historian Russell Fries notes, "the business history of the Patent Arms Manufacturing Company, from 1836 to 1841, is primarily the story of gradual disenchantment between Colt and the company over the issue of sales to the government."[14] Colts believed military sales were essential and directed nearly all of his energies in that direction. The other stockholders wanted to market the revolvers to civilians until such a time as the military decided to purchase the Colt sidearm. Pressures on Colt to put the pistol, called the *Paterson* after the location of the factory in Paterson, New Jersey, into production revealed to the investors that the pistol still needed development and perfection. Colt had oversold its state of readiness for series production.

Early tests of Colt's revolving pistol by the U.S. Army in February and June 1837 revealed several weaknesses in the design. It had to be disassembled for reloading, and it required too many cumbersome accessories, which could be lost. Praised for its rapidity of fire, the revolver was judged to be too complex and too expensive to be easily manufactured. This trial was educational for all parties involved in the Patent Arms Manufacturing Company. Sam Colt learned that his pistol was not as perfect as he had been telling people. The shareholders discovered that Colt was more interested in making weapons for promotional purposes than for immediate sale. The company went bankrupt in 1841.

Many excuses have been given for the failure of Colt's first attempt to manufacture a mechanical revolver. As one writer saw it, "Colt failed because he did not yet fully understand the principles of machine manufacture, and because he did not develop his pistol sufficiently prior to marketing it." The result was "an imperfect product at an impractical price."[15] When Colt reentered the revolver business in 1847, he began on a more modest scale, and he kept control of the company in his own hands. His first factory had been established on too grandiose a scale to be immediately profitable. The second time around, Colt rented his factory, contracted out with other manufacturers, and expanded his operations only as his sales warranted.

Colt's Paterson revolvers sparked sufficient interest in this new type handgun to create a demand when America's war with Mexico began in 1846. Many of the Texans drawn into the confrontation had used pistols purchased in 1839 by the Texas government from Patent Arms Manufacturing Company. They found the Paterson to be sufficiently strong and reliable for the mounted fighting man. After a short period of negotiation with Captain Samuel H. Walker of the U.S. Mounted Rifles, Colt and the United States government signed a contract for 1,000 revolvers on 4 January 1847. In order to meet the contract deadline, Colt subcontracted the manufacture of the firearms to Eli Whitney, Jr., on 29 May 1847. The resulting pistol became popularly known as the Whitneyville-Walker. Whitney delivered the officially designated *Colt Model 1847 Army Revolver* the following July.

The Whitneyville-Walker Colt was a significant improvement over the Paterson model. Most important, it was much more robust and very powerful, but gained its strength and power at a severe weight penalty. Although still single-action, the new model had a permanently-fixed trigger and trigger guard, whereas the Paterson had a folding trigger. The Whitneyville-Walker also had an attached rammer and lever to assist in loading. In many Paterson revolvers, this function was carried out with a separate loading tool.

After this first successful contract, others followed. On 13

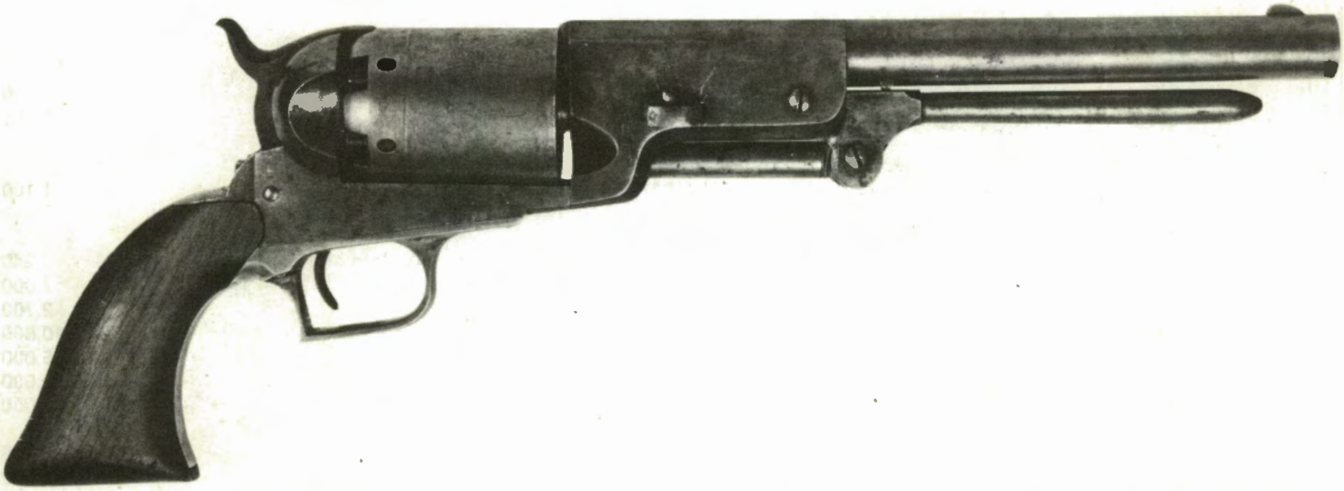


FIGURE 1–19. This model of the 1847 Army Revolver was manufactured at Eli Whitney's armory in Whitneyville, Connecticut. From Samuel Colt's own collection, this Whitneyville-Walker was supposedly Samuel Walker's own revolver, sent back to Colt from Mexico following Walker's death in October 1847. (*Colt*)

TABLE 1-1 COMPARISON OF THREE EARLY COLT MODELS

	Texas Model Revolver (1836–1841)	*Whitneyville-Walker Colt Model 1847 Army Revolver*	*First Model Dragoon Colt Model 1848 Holster Pistol*
Caliber	**.40 (10.16mm)**	**.44 (11.18mm)**	**.44 (11.18mm)**
Overall length	**355.6mm**	**393.7mm**	**355.6mm**
Weight empty	**1133 g**	**2070 g**	**1984.5 g**
Barrel length	**228.6mm**	**228.6mm**	**114.3mm**
Number of shots	**5**	**6**	**6**

July 1847, Colt received permission to build a second lot of 1,000 revolvers of a new model. Known variously as the *Dragoon Model*, the *Old Model Army*, and the *Model 1848*, this new revolver series was a winner. Between 1848 and 1860, approximately 20,000 Dragoons were manufactured. The U.S. military purchased more than 7,000 from 1848 to 1856. Colt moved his operations to Hartford, Connecticut in 1847 where over the next four years he moved from one building to another as his production levels grew. And he added new people to his production staff. His most important new employee was Elisha K. Root, who came to Colt in 1851 to be general supervisor of the manufacturing operations. Root went about adding many new machine tools—automatic drop hammers, turret lathes, barrel rifling machines—to the factory, speeding up the manufacturing process and reducing the machining time for each part to the minimum.

By the time the Dragoon model pistols were being manufactured, the Colt pistol mechanism had evolved to the form it would have until 1878 when a double-action mechanism would be introduced. Sam Colt, with designer-engineer Elisha Root's assistance, set out to capture the military and civilian markets of the United States and Europe. The size and shape of the handguns they produced varied, but the mechanism remained essentially the same. Their one attempt to develop a new revolver hammer mechanism, called the Root sidehammer, was more suited to revolving rifles and muskets than pistols. (About 40,000 Root pistols and about 17,000 to 18,000 long arms were made.) Before 1873 when the new centerfire Model P was introduced, Colt had produced more than 850,000 single-action percussion revolvers.

Challenges to Colt's Monopoly

Sam Colt was successful, in part, because he had a virtual monopoly. As late as 1849, his main competitors were the builders of multibarreled revolving arms called pepperboxes. There were no revolver makers in England, and on the Continent only Devisme and Lenormand were making such weapons, and then by hand. In the United States, Colt did not have a rival until 1850 when the Massachusetts Arms Company of Chicopee Falls introduced a revolver. But the idea of a revolver was a good one, and naturally other manufacturers wanted to cash in on the business.

The firm of Wesson, Stevens, and Miller of Hartford, Connecticut, had been producing hand-rotated revolvers under designer Daniel Leavitt's American patent 182 of 29 April 1837. On 5 March 1850, the Massachusetts Arms Company was incorporated to manufacture a Leavitt revolver that had

TABLE 1-2 COLT REVOLVER (HANDGUN) PRODUCTION, 1836–1873

Patent Arms Manufacturing Company, Paterson, New Jesery	
Paterson Pocket Model Revolver No. 1 (c. 1836–1838), ca.	**500**
Paterson Pocket Model Revolver No. 2 (c. 1838–1840), ca.	**800**
Paterson Belt Model Revolver (1838–1840), ca.	**900**
Paterson Holster Model Revolver (Texas Model) (c. 1838–1840), ca.	**1,000**
Colt (Whitney Armoury), New Haven, Connecticut	
Whitneyville-Walker, M1847 Revolver (Serial #1–1100) (1847), ca.	**1,100**
Colt, Hartford, Connecticut	
Whitneyville Hartford Dragoon Revolver ("Transitional Walker"; serial #1100–1340) (late 1847), ca.	**240**
First Model Dragoon M1848 Revolver (Serial #1341–about 8,000) (1848–1859), ca.	**7,000**
Second Model Dragoon M1848 Revolver (Serial # ca. 8000–10,700) (1850–1951), ca.	**2,700**
Third Model Dragoon M1848 Revolver (Serial # ca. 10,200–19,600) (c. 1851–1861), ca.	**10,500**
Model 1848 Baby Dragoon Revolver (Serial #1–15,500) (c. 1847–1850), ca.	**15,000**
Model 1849 Pocket Revolver (1850–1873), ca.	**325,000**
Model 1849 was also made in London (1853–1857), ca. (Serial # for both 12,000–340,000)	**11,000**
Model 1851 Navy Revolver (1850–1873)	**215,348**
Model 1851 was also made in London (1853–1857) (Serial # 1–215,348 and 1–42,000)	**42,000**
Model 1855 Sidehammer Pocket Revolver (Root sidehammer; made in two distinct serial series) (c. 1855–1870), ca.	**40,000**
Model 1860 Army Revolver (Serial #1–200,500) (c. 1860–1873), ca.	**200,500**

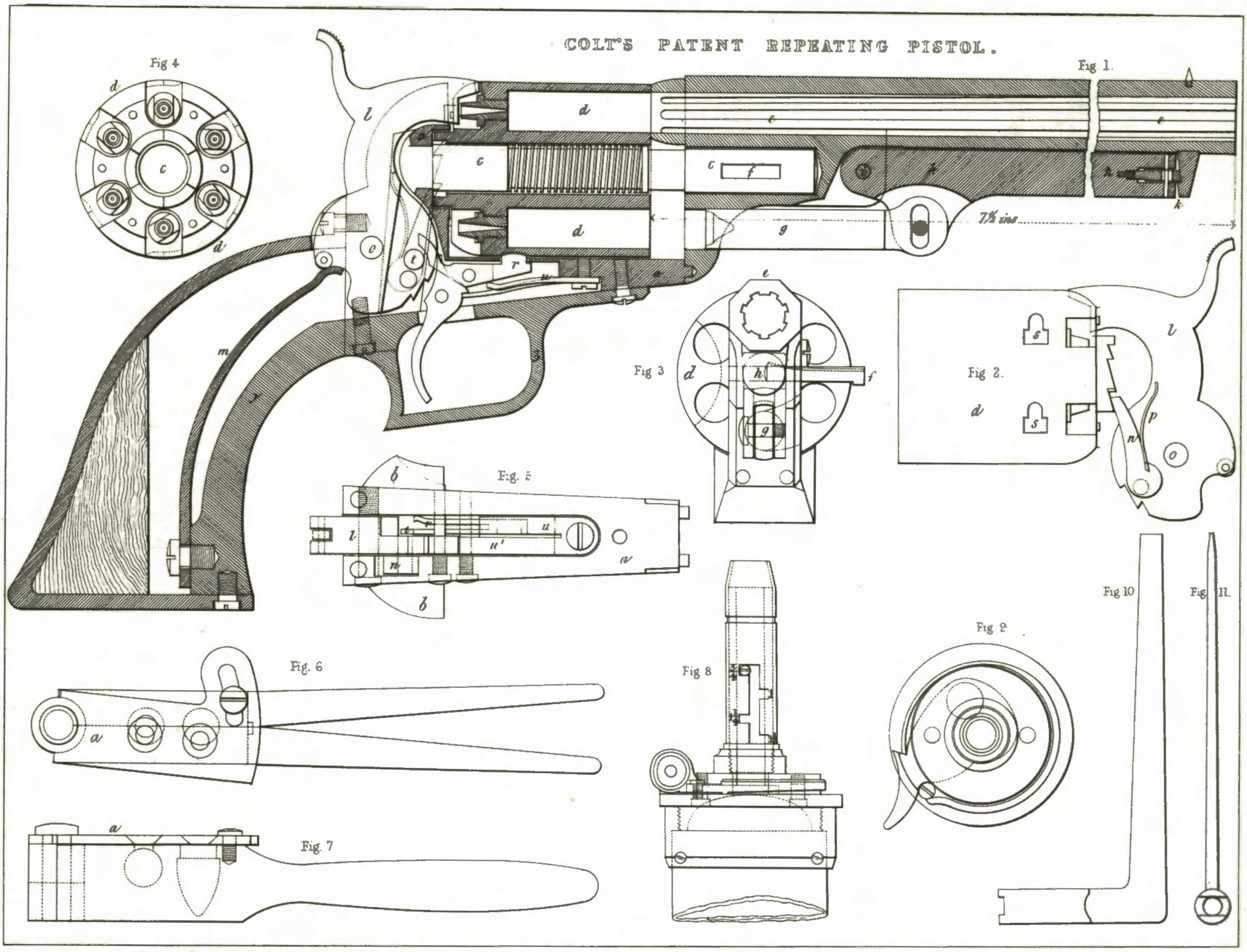


FIGURE 1–20. The Colt Dragoon percussion revolver as illustrated in *The Artizan Journal* (1852). (*The Artizan Journal*)

been modified by Edwin Wesson. Upon cocking the hammer, the cylinder of this pistol was rotated by a set of bevel gears rather than by the hammer-linked pawl. Although Wesson died before his patent on the bevel gear arrangement was granted (U.S. patent 6,669, 28 August 1849), his colleagues went ahead with the manufacture of his revolver.

Colt brought suit to protect his patent rights based on a three-point infringement of his patent: 1. the Massachusetts Arms Company revolver turned the cylinder by the action of cocking the hammer (no mention was made of the use of gears instead of the pawl); 2. locking and unlocking the cylinder by the same action of the hammer; and 3. the use of a partition between the nipples to prevent simultaneous discharge. After a long and costly court battle, Colt won his case against his rival. The Massachusetts Arms Company had to pay legal costs of $50,000 and royalties to Colt amounting to $15,000. Until the expiration of his patent in 1856 (the patent was renewed for an additional seven years on 24 October 1848), Colt had a monopoly on mechanically-rotated revolving arms in the United States.[16] But in England at the 1851 Great Exhibition of the Works of Industry of All Nations, a revolver was displayed that promised to give Colt his first serious competition.

The Crystal Palace, a huge iron and glass exhibition building, situated in London's Hyde Park, provided a showcase for the industrial and agricultural products of the world. Here people could compare the products of many countries on such a grand scale. Two types of revolving pistols were on display when the exhibit opened in May 1851—Sam Colt's and a new revolver patented by Robert Adams (1809–1870) (British patent 13,527, 24 February 1851). There was only one ornately engraved Adams revolver at the exhibition, housed at the stand of George and John Deane, who displayed the products of several Birmingham (England) gunmakers. As Colt had a large display case filled with his ordinary, unornamented machine-made pistols, he received nearly all the attention of the public and the press.

Sam Colt's revolvers were essential companions of the "pioneers of civilization in Texas" and suitable for adventurers who would join Sir Harry Smith at the Cape of Good Hope. The *Times* of London saw these weapons as a "new method of vaccination" for the "rude tribes who yet encumber the wilderness with their presence," and the editor went as far as to suggest that the Colt "six-chambered revolving pistol. . .in all probability will supersede the fire-arms at present carried by the cavalry of every military power."[17]

A confrontation between Colt and his English rival was inevitable. Colt's revolvers received an honorable mention at

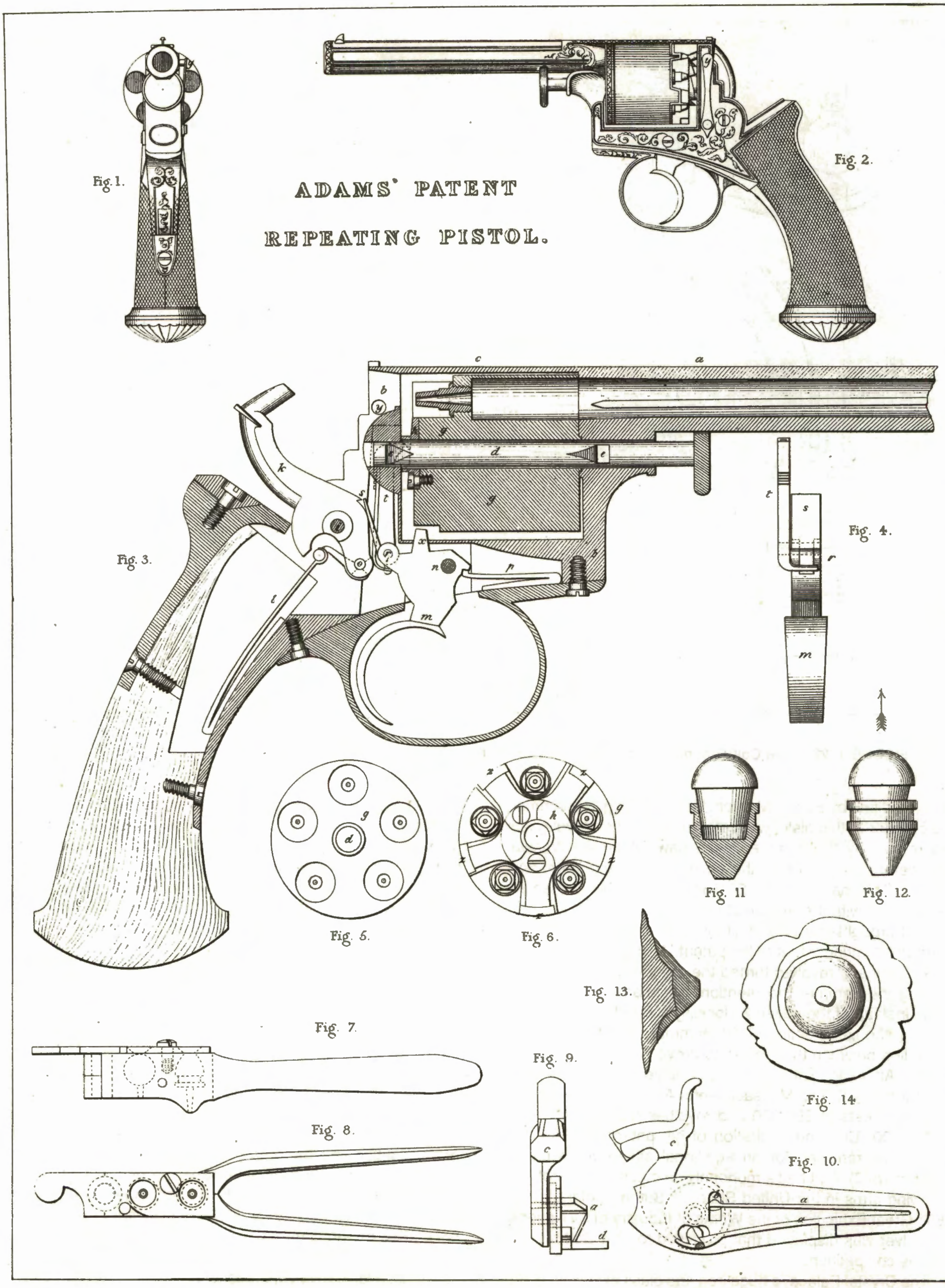


FIGURE 1–21. The Adams self-cocking percussion revolver as illustrated in *The Artizan Journal* (1852) (*The Artizan Journal*)

the Exhibition, while a prize medal was awarded to the arms displayed by the Deane brothers. But more important was the 10 September 1851 trial at the Royal Arsenal at Woolwich, where for the first time the two handguns were tested together officially and in public. The *Times* reported on the two-hour demonstration.

> The experiment commenced at 11 o'clock, with Mr. Colt's revolving pistol at 50 yards range, and the practice was very good, in several instances the whole of the six balls striking the target . . .

But according to a promotional brochure of Deane, Adams & Deane, the Adams revolver outperformed the Colt. Presumably, the Adams revolver took less time to load than the Colt (38 seconds as compared to 58 seconds), was more accurate using round or conical balls, and did not misfire once during the Woolwich trial (while the Colt misfired many times).[18] The five-shot Adams revolver weighed 1,304 grams (compared with Colt at 1,985 grams) and was designed in .500 caliber (12.7 mm).

In spite of several "shootoffs" between the Adams and Colt handguns, neither revolver received the attention its designers wanted from the British government. In fact, the Board of Ordnance went on record against both weapons. The ostensible reason for unacceptability was the smallness of the percussion caps, but more likely was the absence of a clear-cut need for these still-to-be-perfected handguns. Nevertheless, Colt and Adams vied for public attention and potential government contracts.

On 25 November 1851 in England, Colt delivered a paper, "On the Application of Machinery to the Manufacture of Rotating Chambered-Breech Fire-arms," to the Institute of Civil Engineers. At the close of the question-and-answer session that followed, Robert Adams had an opportunity to describe his revolver. Unhappy as it made Sam Colt, the American gunmaker had to share the stage with Adams and his revolver. The Adams was strikingly advanced in concept, with the solid frame and barrel being made from a single forging. Colt's revolver consisted of three main assemblies—barrel, frame, and cylinder. There was no top strap across the cylinder to connect the frame to the barrel. Colt would not have a solid frame revolver until 1873. The Colt Company was likewise slow in introducing a self-cocking double-action mechanism (1878).

As Sam Colt set about to establish a London factory in Bessborough Place, Millbank, near the Vauxhall Bridge, Robert Adams sought the assistance of established gunmakers to secure the production of his arm. Production of the Adams revolver appears to have been divided among the following: Robert Adams, Weston Street factory, Bermondsey, London; William Tranter, Birmingham; Hollis & Sheath, Birmingham; Joseph Brazier, Wolverhampton; Ancion & Cie, Liège, Belgium; C. Dandoy, Liège; A. Francotte, Liège; and Pirlot Frères, Liège. Deane, Adams & Deane sold the early Adams revolvers from 1851 to 1856. From 1856 until 1867, the London Armoury Company Ltd. sold the Beaumont-Adams. The Belgian firms produced the Adams for sales on the Continent under licenses based on Adams' Belgian patent 5061/794, 7 October 1851.

FIGURE 1–22. Robert Adams demonstrating the correct method of loading the Beaumont-Adams revolver. This engraving made from a contemporary photograph first appeared in Patrick Edward Dove, *The Revolver* (London, 1858). (*Dove*)

Exact details of Adams' production processes are not available. It is not even known if he made entire revolvers or whether he assembled them from components supplied by Tranter, Hollis & Sheath, and Brazier. Or did these concerns build up guns on frames supplied by Adams?

In terms of production mechanization, the British gunmakers were far behind Colt. Sam Colt's contribution to the European handgun industry was the introduction of the "American System" of machine production. Colt's London factory was not a commercial success (in business only from 1853 to 1857), but he did demonstrate to the British the possibilities of making handguns by machine. Charles Dickens described the Colt London factory in a 27 May 1854 article for his magazine *Household Words*. Dickens' account is significant because he describes the first "mass-production" factory to be established outside the United States. Mechanized production of this sort, even if not on a fully interchangeable parts basis, was a major prerequisite for the subsequent evolution of handguns, revolvers, and self-loaders.

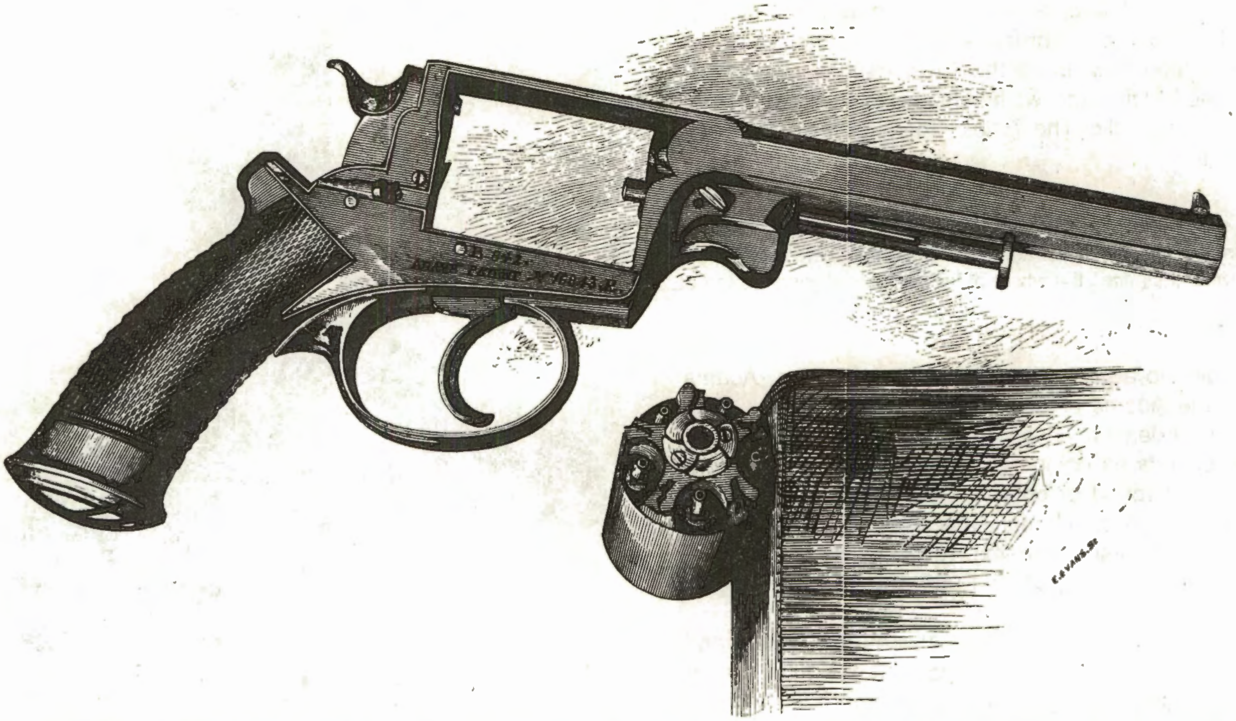


FIGURE 1–23. The Beaumont-Adams revolver presented by Robert Adams to His Royal Highness, Albert, Prince Consort. (*Dove*)

We are on the threshold of Colonel Colt's factory, in the sombre and smoky region of Millbank. Under the roof of this low, brick built, barrack-looking building, we are told that we may see what cannot be seen under one roof elsewhere in all England—the complete manufacture of a pistol, from dirty pieces of timber and rough bars of cast steel, till it is fit for the gunsmith's case. To see the same thing in Birmingham and in other places where firearms are made almost entirely by hand labour, we should have to walk about a whole day, visiting many shops carrying on distinct branches of the manufacture; not to speak of the toolmakers, the little screw and pin makers; all of whose work is done here. "We are independent people," says my informant, "and we are indebted to no one, save the engine and fixed machine makers." This little pistol which is just put into my hand will pick into more than two hundred parts, every one of which parts is made by a machine. A little skill is required in polishing the wood, in making cases, and in guiding the machines; but mere strength of muscle, which is so valuable in new societies, would find no market here—for the steam engine—indefatigably toiling in the hot, suffocating smell of rank oil, down in the little stone chamber below—performs nine-tenths of all the work that is done here. Neat, delicate-handed, little girls do the work that brawny smiths still do in other gun-shops. Most of them have been sempstresses and dressmakers, unused to factory work, but have been induced to conquer some little prejudice against it, by the attraction of better pay than they could hope to get by needle-work. Even the men have, with scarcely an exception, been hitherto ignorant of gunmaking. No recruiting sergeant ever brought a more miscellaneous group into the barrack-yard, to be drilled more rapidly to the same duty, than these two hundred hands have been. Carpenters, cabinet-makers, ex-policemen, butchers, cabmen, hatters, gas-fitters, porters, or, at least, one representative from each of those trades, are steadily drilling and boring at lathes all day in upper rooms. . . .Perhaps if men who have learnt but one trade, and have grown old in it, could be as easily absorbed into another, when desirable, as these new gunsmiths are, the working world would go more smoothly than it does. The girls here earn from two to three shillings per day; the boys the same. The men get from three to eight shillings per day of ten hours; while one or two, being quick, clever, and reliable, are paid regularly twelve shillings per day. What is commonly called piece-work is not the system usually adopted here. It has been found to tempt the men to hurry their work at the expense of a neat finish, and the manager prefers to give a workman six months' trial, during which he learns his business of gun-making by machinery, and is also sure by that time to have shown what wages he is worth. Only twelve of these people are Americans: one or two Germans; the rest are English.

Listening to these facts as my conductor communicates them, we pass into a long room hung with targets as they appeared after firing at them with Colt's revolvers. All the bullet marks are, of course, very near the bull's eye—which, I hope I am not presumptuous or depreciatory of the great Colt invention in attributing in some measure to the marksman. Beyond this is the store room, lined with wooden racks up to the ceiling, which are almost naked now, only five pistols of all the number that are made here—six hundred a week—being at this moment in store. For there is a new government order for the Baltic; and as fast as they are finished the pistols are sent away, packed in deep cases, that look very large indeed, considering that they are only for five-and-twenty single pistols each. But the conical balls and bullet-moulds, powder-flasks and percussion caps take up more room than the pistols themselves.

Out of the hot atmosphere, and the all-pervading odour of hot oil, we pass a yard ankle deep in iron chips (which make a dry hard road in all weathers, very destructive to leather) into a long out-building, in which the only genuine smiths are at work. Here the very beginning of the pistol is made; if we except the cutting and polishing of the stock, which have been already described in these pages. There is little of the noise of a smithy here except

the roaring of the furnaces. A workman rams the end of a long bar of steel into the fire; and, taking it out glowing with heat, strikes a bit off the end as if it were a stick of peppermint; while his companion, giving it a couple of rough taps upon the anvil, drops the red-hot morsel into a die. This die is a plug-hole shaped something like a horse-shoe, at the foot of a machine, bearing a painful resemblance to a guillotine. While they have been breaking off the bit of steel, a huge screw had been slowly lifting up the iron hammer-head, which plays the part of the axe in the guillotine; and now the great hammer drops, and with one stroke beats the piece of iron to the form of the die. It has cooled to a black heat now, and is shaped something like the sole of a very narrow shoe; but it must be heated again, and the heel end must be beat up at right angles to the long part—taking care that it be bent according to the grain of the metal, without which it will be liable to flaw. Thus the shield, and what may be called the body of the pistol, are made in an instant.

In Birmingham, the barrels of fire-arms are made of old nails that have been knocked about, and which are melted, rolled into sheets, twisted again, and beaten about, till they are considered to be tougher and less likely to burst; but the American gunsmiths know nothing about this. They merely beat the end of the bars of cast steel again and beat it with steam hammers; for it would not do to draw it through holes, as thick wire is drawn, or to roll it as with ordinary round bars. These hammers are fixed, five in a frame, where they quiver with a chopping noise too rapidly to count the strokes, over a little iron plate, never touching it, though coming very close. Into the first of these the smith thrusts the red end of the bar, and guides it till it is beaten square. The next hammer beats it smaller, but still square; the next hammer beats it smaller and longer still, but rounder. The fourth hammer beats it quite round, and the fifth strikes off the exact length for the barrel. This gradual process is absolutely necessary, for the steel will not bear being beaten round the first time; and, although five barrels may be thus forged in one minute, the rapid strokes of these hammers are said to make it quite as tough as the Birmingham plant; which seems to be borne out by the results at the Proof House. On the same floor, the barrels and cylinders, after polishing, are case-hardened, and tinted blue, by burning in hot embers; processes which are well known.

Across the yard strewn with chips of iron again, and through the tool room, where men are turning great screws and other bolts and portions of machinery, we mount to the first floor, and enter a long room filled with machines, and rather more redolent of hot rank oil. Considering that the floor supports a long vista of machinery in full action, the place looks clean and neat, and is not very noisy. Girls quietly attending to the boring and rifling of the barrels—having nothing to do but to watch the lathe narrowly, and drop a little oil upon the borer with a feather now and then—men drilling cylinders, holding locks to steam files, cutting triggers, slotting screws, treating cold iron everywhere as if it was soft wood, to be cut to any shape, without straining a muscle. It would be difficult and tedious to describe these machines minutely, although they are very interesting to a spectator, and cannot, I believe, be seen elsewhere. Every one of them is a simple lathe; but it is in the various cutters, borers, and riflers that the novelty and ingenuity exist. Where the thing to be made is of eccentric shape, the cutter is of eccentric shape also; and although the superintendent of each machine acquires more or less skill by practice, it is in the perfection of these cutters and borers that the guarantee for uniformity consists. The bores of barrels and cylinders must be mathematically straight, and every one of the many parts must be exactly a duplicate of another. No one part belongs, as a matter of course, to any other part of one pistol; but each piece may be taken at random from a heap, and fixed to and with the other pieces until a complete weapon is formed; that weapon being individualised by a number stamped upon many of its component parts. The advantage of these contrivances is obvious. In every case of revolvers are placed, when sold, a number of such parts of a pistol as are most liable to accident; and, any soldier may, in a few minutes, repair his own weapon.[19]

Although Colt's London operation was not profitable, he

FIGURE 1–24. A typical Beaumont-Adams double-action, percussion revolver. (*Smithsonian*)

TABLE 1-3 BRITISH GOVERNMENT ORDERS FOR PERCUSSION REVOLVERS, 1853–1881

Date	Quantity	Model	For whom procured
Apr 1853	2	Adams revolvers	Board of Ordnance
Je 1853	20	Adams revolvers	Board of Ordnance
8 Mar 1854	4,000	Colt revolvers	Royal Navy
Mar 1854	3,500	Colt revolvers	Baltic and Black Sea Fleets, Royal Navy
Aug 1854	2,000	Colt revolvers	Royal Navy
25 Sep 1854	59	Colt revolvers	Board of Ordnance
23, 26 Dec 1854	5,000	Colt revolvers	British army
2 Aug 1855	9,000	Colt revolvers	British army
31 Aug 1855	300	Beaumont-Adams revolvers	British army
4 Oct 1855	123	Beaumont-Adams revolvers	War Department
3 Jan 1856	2,000	Beaumont-Adams revolvers	War Department
1857–1860	17,000	Beaumont-Adams revolvers	British government

did sell about 9,500 revolvers to the Royal Navy and about 14,000 to the British army during the Crimean War, with 5,000 of these being imported from America. The British military authorities ultimately decided to adopt British revolvers for their armed services, and the first British military revolvers evolved from the Adams design.

The British government acquired about 19,400 Beaumont-Adams percussion revolvers from 1855 to 1856. Between 1869 and 1881, the British purchased more than 7,300 breech-loading cartridge Adams revolvers, Marks I, II, III. It is not known how many Beaumont-Adams revolvers were converted to cartridge-firing breech-loaders, officially designated "Pistol, revolver, Deane & Adams' converted to a breech-loader, Mark I." The acquisition of Enfield Mark I and later revolvers is discussed in chapter two. It should be noted that in the years 1858 to 1860 the War Department purchased 10,000 additional single-shot percussion muzzle-loading pistols for use by mounted troops. Only in 1878 was the *Pistol, Revolver, Adams, Central Fire, Breech Loading, Interchangeable (Mark II)* approved for issue to the cavalry and lancers. Many military men in Great Britain, the United States, and Europe found it difficult to accept immediately the revolver as a replacement for the single-shot muzzle-loader, but by the 1870s they saw its merits, just as they were slowly accepting the value of the breech-loading rifle and carbine.

Significant Improvements

Comparing the Colt and Adams revolvers, the Adams had only two shortcomings—the absence of a bullet rammer and an inability to fire as a single-action weapon. A lever projectile rammer inspired by John Rigby, (British patent 1,976, 11 September 1854) was added in 1855 after considerable experimentation. Adding a single-action feature, however, was a more complex task. The major complaint against self-cocking revolvers was the effect pulling the trigger had on accuracy. While the pull-through action of the self-cocking provided a quick first shot in an emergency, that same process caused the weapon to be drawn up and to the right from the point of aim. What Adams needed was a mechanism that combined the advantages of the single-action lock and the self-cocking lock; that is, a true double-action lock. Adams experimented with a hesitation lock of his own design, but abandoned it in favor of a double-action lock patented by Lieutenant F. E. B. Beaumont (British patent 374, 20 February 1855). Beaumont's improvement to Adam's lock mechanism consisted of the addition of a thumb-spur to the hammer and an extra sear to hold the hammer when cocked single-action by thumb. Otherwise, the Adams self-cocking mechanism was unaltered. Most Beaumont-Adams revolvers were fitted with James Kerr's lever-rammer (British patent 1,722, 28 July 1855).

One other pioneer in revolver design deserves attention. Rollin White (1817–1892) was the classic example of the eccentric inventor. An appropriate title for his biography, might be *The Plaintiff Rollin White,* because he always seemed to be in court defending his many patents. In the history of revolver development, he held the key patent for the bored-through cylinder necessary for cartridge-firing revolvers.

White had worked for his brother, a parts contractor for Colt, during the years 1849 to 1857. During this period, he sought a means for cutting the time it took to reload the percussion revolver. His solutions involved two different designs—one pistol had a magazine at the rear of the cylinder,

TABLE 1-4 CHRONOLOGY OF BRITISH GOVERNMENT CARTRIDGE REVOLVER PROCUREMENT, 1868–1881

Date	Event
20 Nov 1868	Beginning of conversion program for Beaumont-Adams revolvers to "Pistol, revolver, Deane & Adams', Converted to a breech-loader, Mark I" by the Admiralty.
23 Feb 1872	"Pistol, Revolver, Adams, Central Fire Breech Loading, Interchangeable (Mark II)" adopted by the British government.
24 Aug 1872	Model 1872 "Pistol, Revolver, Adams, Central Fire, Breech Loading, Interchangeable (Mark III) adopted by the British government.
1872–1881	About 7,300 Mark II and Mark III revolvers delivered to the British government.

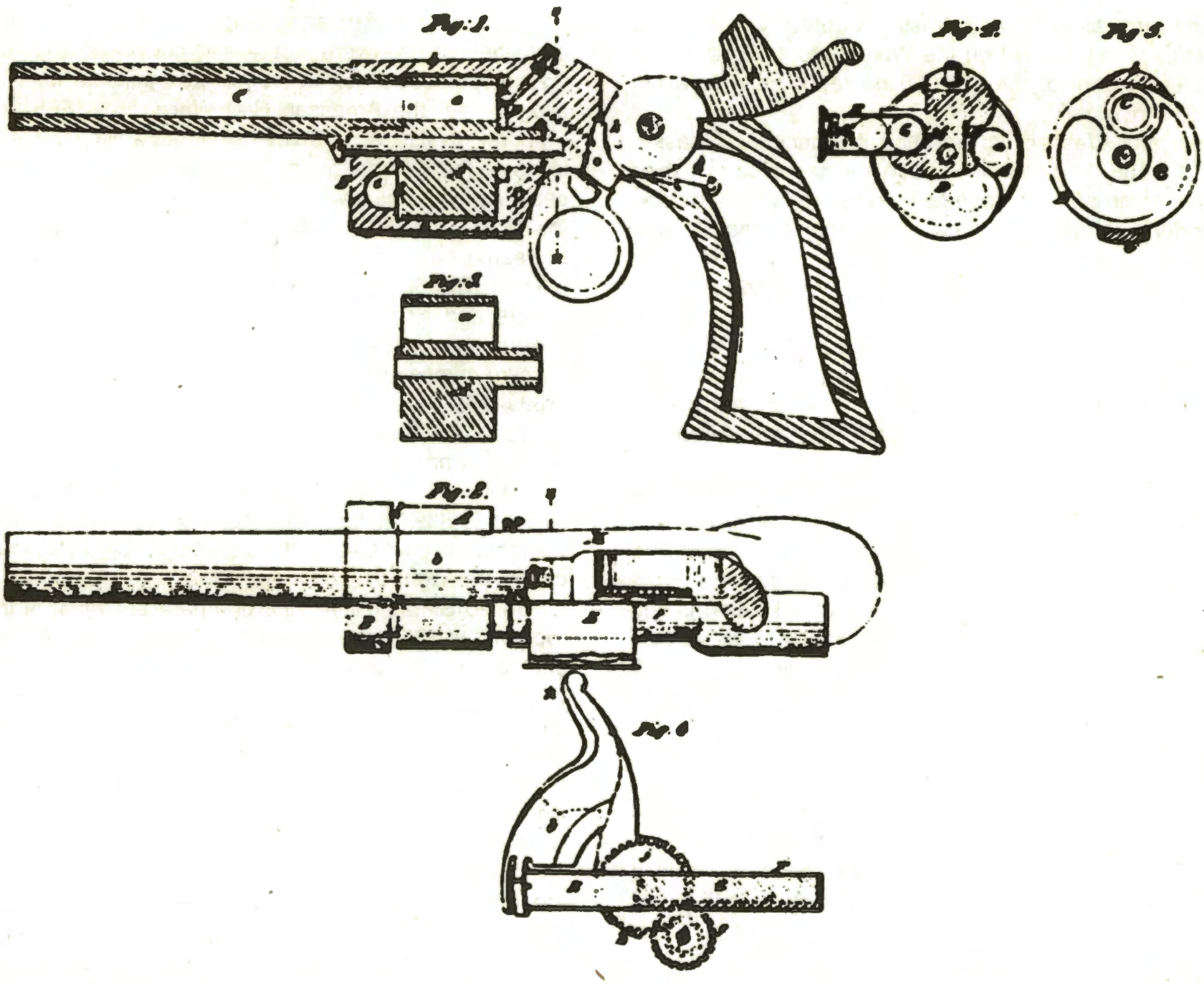


FIGURE 1–25. Rollin White's patent number 12,648 was issued on 3 April 1855, covering the use of a cylinder bored through from front to back, making it possible to utilize the newly patented rimfire cartridges of Horace Smith and Daniel B. Wesson. In order to avoid infringing on White's patent rights, many gun manufacturers attempted to develop other cartridges and cylinder systems without noteworthy success. The first Smith & Wesson revolver was put on the market in 1857 as the Model number 1 in .22 caliber. (*U.S. Patent Office*)

and the other had a magazine at the front of the cylinder. Although neither weapon was very practical, his patent claim for "extending the chambers through the rear of the cylinder for the purpose of loading them at the breech" was of interest to anyone who planned to use the new metallic cartridges. Rollin White, awarded patents (12,648 and 12,649) on 3 April 1855, could not interest Sam Colt in his idea. When Colt looked at White's model guns, he saw only mechanical nightmares and failed to recognize the significance of the bored-through cylinder. Usually astute, Colt passed up the patent that was second in importance only to his own original patent on the revolver. However, Daniel Baird Wesson (1825–1906) and Horace Smith (1808–1893) did see the importance of White's patent.[20]

Smith and Wesson had two partnerships. The first one, 1852 to 1855, produced the lever-action, magazine-fed repeating pistol, best known as the *Volcanic pistol* (see chapter 3). In July 1855, the Volcanic Arms Company was established to produce Smith and Wesson's repeating pistol. While working for Volcanic, Daniel Wesson experimented with various small arms ideas and in August 1856 completed the design of a .22 caliber self-contained metallic cartridge revolver. Sam Colt's master patent for the revolver had expired in February, thus removing a major stumbling block to the sale of a new revolver. But another patent stood in Wesson's way; Rollin White's patent covered cylinder-type revolvers loaded from the breech. Wesson wrote to White in late October 1856.

> I notice in a patent granted to you . . .one claim—viz—extending the chambers of the rotating chamber right through the rear end of said cylinder so as to enable the said chambers to be charged from the rear end either by hand or by means of a sliding charger.

Wesson wanted to "make arrangements" with White to use this patent claim in a new revolver. Smith, Wesson, and White concluded an agreement on 17 November 1856, and the two business partners obtained an exclusive license to manufacture handguns having a bored-through cylinder. White was to receive a royalty of twenty-five cents per handgun until the expiry of his patent in 1869. White also agreed to defend the patent in court as necessary, and this clause kept him busy

for many years as Smith and Wesson vigorously prosecuted companies who infringed on the White patent. Rollin White earned every cent of the $70,000 he received in royalties from 1857 to 1869.[21]

Smith and Wesson set up shop in Springfield, Massachusetts in 1857 and embarked upon the manufacture of their revolver, which they appropriately and optimistically named the *Model 1.* Intriguingly, they only manufactured .22 and .32 caliber revolvers for the first eight years of their new partnership. Only after the American Civil War ended in 1865 did the partners pursue a large caliber (.44) handgun.

In Great Britain, there was no equivalent to the Rollin White master patent for cartridge revolvers. Revolver makers Tranter, John Deane & Son, Tipping & Lawden, and others began to manufacture rim-fire revolvers in the early 1860s. On the Continent, rim-fire cartridges were quickly superseded by the center-fire (also called central-fire) cartridge. Few solid-frame revolvers were adapted for them, however, and the low-price end of the handgun market continued to be dominated by pin-fire revolvers. The latter had been originated by Casimir Lefaucheux of Paris (1843 patent). The Swiss army was the major military exception to the center-firerule, having adopted the 10.4mm Chamelot, Delvigne & Schmidt revolver in 1872.

It is important to note that by 1858 all the design elements necessary for a modern military revolver were present—solid frame (Adams), tip-open frame (Smith & Wesson), single-action (Colt), double-action (Beaumont-Adams), metallic self-contained cartridge (White), and center-fire priming (Devisme, 1858). Equally important, the technology for making machine-fabricated handguns had evolved by the late 1850s to permit the production of large quantities of handguns. But the United States Army would not adopt a cartridge revolver until 1873.

Regular American army officers, the men who ran the peacetime army, were not easily convinced that the revolver—percussion or cartridge—was suitable for the cavalry. Neither the American Civil War (1861–1865) nor the Franco-Prussian War (1870–1871) had proven to the Americans or the Europeans that the revolver could replace the saber as the primary weapon for the mounted soldier. During the 1870s, the British issued about 24 revolvers and about the same number of carbines per cavalry regiment for the officers. The 500 or so rank and file of the regiment carried sabers and single-shot percussion pistols. British artillery drivers were issued revolvers after the Afghan and South African campaigns in the 1880s, and in the Boer War (1899–1901) the British recognized the value of the revolver as a personal defense weapon when fighting in the trenches the Boers had dug. But these campaigns were viewed as unusual conflicts. In a real European war—another Crimean type of battle—it was generally believed that the *arme blanche,* the cold steel of the saber or lance, would carry the cavalry through.

United States military thinking parallelled that of the Europeans. In 1855, the army adopted the Model 1855 single-shot percussion pistol carbine. (Between 1855 and 1857 4,021 were made.) Sixteen years later, the army adopted the single-shot *.50 caliber* (12.7mm) *center-fire rolling block pistol.* Between 1872 and 1888, the Remington Arms Company, Ilion, New York, built approximately 6,000 of these single-shot sidearms, which were intended as replacements for the carbine for cavalry troopers wielding sabers. Except for Civil War cavalry and mounted forces fighting Indians in the American West, Americans would fight armed, as the Europeans, with single-shot pistols and sabers. Against a domestic guerilla-type enemy, they would carry revolvers and carbines. In 1876, General Winfield Scott Hancock, com-

FIGURE 1–26. The Smith & Wesson .22 caliber (5.6mm) No. 1 cartridge revolver built to take advantage of Rollin White's patent for the bored through cylinder. (*Smithsonian*)

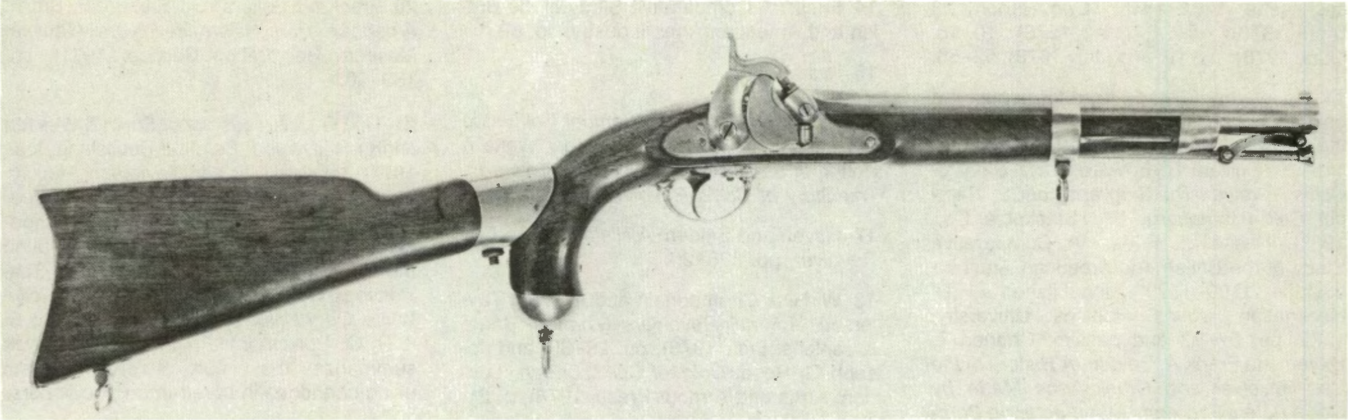


FIGURE 1–27. The U.S. Pistol-Carbine, Model 1855, made at Springfield Armory in 1856, was adopted as a cavalry weapon. The pistol alone was used by the mounted trooper. Dismounted he would fire the weapon like a carbine with the stock attached. Pistol and stock were carried in a two-pouch holster slung over the saddle's pommel. As with other 1855 pattern American weapons, the Maynard tape-type priming system was used. The pistol in caliber .58 (14.7mm) was 451 millimeters long; with stock it was 718 millimeters. The barrel alone was 305 millimeters long. The pistol weighed 1,729 grams; with stock it was 2,466 grams. (*U.S. Army*)

mander, Division of the Atlantic, told a congressional committee that the pattern of equipment or structure of troop organizations fighting on the frontier was of no significance when determining the equipment and structure of the "real" army.[22] With the advantage of hindsight, it is difficult to see the logic expressed by the military men of the 1860s and 1870s.

Despite hesitance on the part of authorities, the cartridge-firing revolver was adopted by the world's armed forces in the final decades of the nineteenth century. Though there were many different models—a bewildering variety—there were just a few basic mechanisms.

NOTES

1 An introduction to early firearms can be found in Claude Blair, *European & American Arms, c. 1100–1850* (New York: Bonanza Books, 1962), pp 39–48ff; and Blair, *Pistols of the World* (New York: Viking Press, 1968).

2 Blair, *Pistols of the World,* p. 1, cites R. Rathgen, *Das Aufkommen der Pulverwaffe* (Munich, 1925), p. 37: "*. . .500 bomarbe una spanna longhe, che le protavano su in mano, bellissimi e passavano ogni armatura.*"

3 Blair, *Pistols of the World,* p. 1.

4 A basic study on matchlocks is M. Thierbach, *Die Geschichtliche Entwickelung der Handfeuerwaffen* (Dresden: Carl Hockner, 1886–87).

5 Blair, *European & American Arms,* p, 43; Blair, *Pistols of the World,* p. 3; Blair, "Further Notes on the Origins of the Wheellock," in Robert Held, *Arms and Armor Annual,* vol. 1 (Chicago: Follett Publishing Co., 1973), pp. 28–47; and Vernard Foley, with F. Charles Logan and David C. Cassidy, "Leonardo, the Wheellock, and the Milling Process" (work in progress, 1980), 72 pp.

6 Torsten Lenk, *Flintåset. Dess uppkomst och utveckling* (Stockholm: Nordisk Rotogravyr for Kungl. Livrustkammaren, 1939), pp. 11–21, available as Lenk, *The Flintlock: Its Origins and Development,* G. A. Urquart, trans., J. F. Hayward, ed. (London: Holland Press, c. 1965); and Blair, *European & American Arms,* p. 45.

7 W. Keith Neal, "The World's Oldest Known Flintlock Pistol?" in Held, *Arms and Armor Annual,* vol. 1, pp. 114–20.

8 Neal and D. H. L. Black, *Forsyth & Co.: Patent Gunsmiths* (London: G. Bell & Sons, 1969); and Geoffrey Boothroyd, *The Handgun* (New York: Bonanza Books, 1970), pp. 56–66.

9 Selma Thomas, "'La plus grande économie et la précision la plus exacte,' L'Oeuvre d' Honoré Blanc," *Le Musée d'Armes* 7, no. 24 (June 1979): 1–4; and Claude Gaier, "Note sur la fabrication des 'platines identiques' et sur la manufacture impériale de platines de Liège," *Le Musée d'Armes* 7, no. 24 (June 1979): 5–9.

10 Edwin A. Battison, "Search for Better Manufacturing Methods," *Tools & Technology* 111, no. 3 (Fall 1979): 9–12 and no. 4 (Winter 1979): 13–14, 16–18; and Merritt Roe Smith, *Harpers Ferry Armory and the New Technology: The Challenge of Change* (Ithaca and London: Cornell University Press, 1977).

11 Robert A. Howard, "Interchangeable Parts Reexamined: The Private Sector of the American Arms Industry on the Eve of the Civil War," *Technology and Culture* 19, no. 4 (Oct. 1978): 633–49.

12 J. N. George, *English Pistols and Revolvers: An Historical Outline of the Development and Design of English Hand Firearms from the Seventeenth Century to the Present Day* (Onslow County, NC: Small-Arms Technical Publishing Co., 1938), pp. 154–60; A. W. F. Taylerson, *Revolving Arms* (New York: Walker and Co., 1967), pp. 3–5; Taylerson, R. A. N. Andres, and J. Frith, *The Revolver, 1818–1865* (London: Herbert Jenkins, 1968); and Willard C. Cousins, "Captain Artemas Wheeler, Gunsmith, Concord, Mas-

sachusetts, 1781–1845," *Gun Report,* 23 (April 1978): 12–21, (May 1978): 10–16, (June 1978): 16–19, and (July 1978): 52–56.

13 No attempt is made here to recount the entire history of the Colt enterprise. Consult the following. Boothroyd, *The Handgun,* pp. 118–20; William B. Edwards, *The Story of Colt's Revolver: The Biography of Col. Samuel Colt* (Harrisburg, PA: Stackpole Co., 1953); Russell I. Fries, "A Comparative Study of the British and American Arms Industries, 1790–1890," unpublished PH.D. dissertation, Johns Hopkins University, 1972, pp. 57–97 and passim; Charles T. Haven and Frank A. Belden, *A History of the Colt Revolver and Other Arms Made by Colt's Patent Fire Arms Manufacturing Company from 1836 to 1940* (New York: William Morrow & Co., 1940); and James E. Serven, *Colt Firearms from 1836* (Harrisburg, PA: Stackpole Books, 1979).

14 Fries, "A Comparative Study of the British and American Arms Industry," p. 69.

15 Ibid., p. 96.

16 Robert M. Patterson, *Samuel Colt v. the Massachusetts Arms Co.* (Boston: White & Potter for Samuel Colt, 1851); and Edwards, *The Story of Colt's Revolvers,* pp. 270–74.

17 Haven and Belden, *A History of the Colt Revolver,* pp. 328–29.

18 W. H. J. Chamberlain and A. W. F. Taylerson, *Adams' Revolvers* (London: Barrie & Jenkins, Ltd., 1976), pp. 29–30; and Joseph G. Rosa, *Colonel Colt, London* (London: Arms and Armour Press, 1976), p. 21.

19 Boothroyd, *The Handgun,* pp. 149–53. *See also* Taylerson, Andres, and Frith, *The Revolver, 1818–1865,* pp. 197–216, for further details on manufacturing techniques.

20 Frank M. Sellers and Samuel E. Smith, *American Percussion Revolvers* (Ottawa: Museum Restoration Service, 1971), pp. 189–90.

21 Roy G. Jinks, *History of Smith & Wesson* (North Hollywood: Beinfeld Publishing, Inc., 1977), pp. 34–55ff; and Taylerson, *Revolving Arms,* pp. 35–39ff. Taylerson is especially informative regarding patent infringements and attempts made to design around the White patent. *See also* Dodge & Son, *Reasons Why the Bill for the Relief of Rollin White Ought Not to Pass* (Washington: S. & R. O. Polkinhorn, Printers, 1874), which summarizes the history of revolving arms using cartridges in bored-through cylinders.

22 Chamberlain and Taylerson, *Adams' Revolvers,* pp. 177–78. These authors first drew my attention to this obvious but unappreciated aspect of handgun history.

2 MILITARY REVOLVERS 1870 to 1900

The dates chosen for this chapter are again somewhat arbitrary. Many of the military revolvers described in the following pages were introduced before 1870, and many were still in service during the Second World War (1939–1945). But perfection of the military revolver occurred during the final three decades of the nineteenth century. Nearly all twentieth century revolvers were just refinements or variations on basic established patterns.

The revolvers described here can be categorized according to the type of lock mechanism employed and the type of frame used.* Although there are numerous sub types, the six main categories of locks are (1) the Colt single-action, evolved from the Model 1847 Whitneyville-Walker; (2) the Beaumont-Adams double-action; (3) the Nagant double-action; (4) the Lefaucheux-Francotte/Chamelot-Delvigne double-action (Belgian patent 13,241, 27 September 1862); (5) the Schmidt-Galand double-action, a variant of the Nagant, and (6) the Smith & Wesson double-action. Their five basic revolver frames are (1) the solid frame, cylinder-fixed with nonmechanical ejection; (2) the solid frame, cylinder-fixed with mechanical (rod) ejection; (3) the top-break, hinged frame with latch; (4) the solid frame, swing-out cylinder, multiple ejection; and (5) the solid frame, gas-seal cylinder system (variant of number 2).

REVOLVER LOCK MECHANISMS

The lock system is the functional heart of the revolver and the easiest method by which to differentiate the models. Table 2–1 categorizes military handguns adopted prior to 1900 by lock mechanism and frame type.

Colt Single-Action

When the hammer of the Colt single-action was rotated to the rear, it bore against a flat-leaf mainspring. The hand, or pawl, which engages the ratchet at the rear of the cylinder, was attached to the hammer. Rotation of the hammer forced the hand forward and up, rotating the cylinder. The cylinder bolt (lock) was depressed by the action of a stud on the right side of the hammer. Depression of the bolt unlocked the cylinder and permitted it to revolve. When the next chamber was aligned with the barrel, the bolt snapped into place in a notch that corresponded with that chamber. The trigger was forced against the hammer by a spring, and when the hammer was drawn to its rearmost position the trigger engaged a notch on the base of the hammer.

Beaumont-Adams Double-Action

Beaumont's modification to the Adams self-cocking mechanism (in addition to the thumb-spur for single-action cocking) consisted of adding an extra sear to hold the piece cocked when the hammer was rotated to the rear by the thumb. When the hammer was thumb-cocked, Beaumont's short sear (fig. 2–2, D) dropped into a full-cock notch cut into the breast of the hammer (C). The long sear (F) was pulled up close to the short sear (D) by a hook on the hammer. When the trigger was pulled, the long sear (F) pushed the short sear (D) out of the full-cock notch so the hammer could fall.

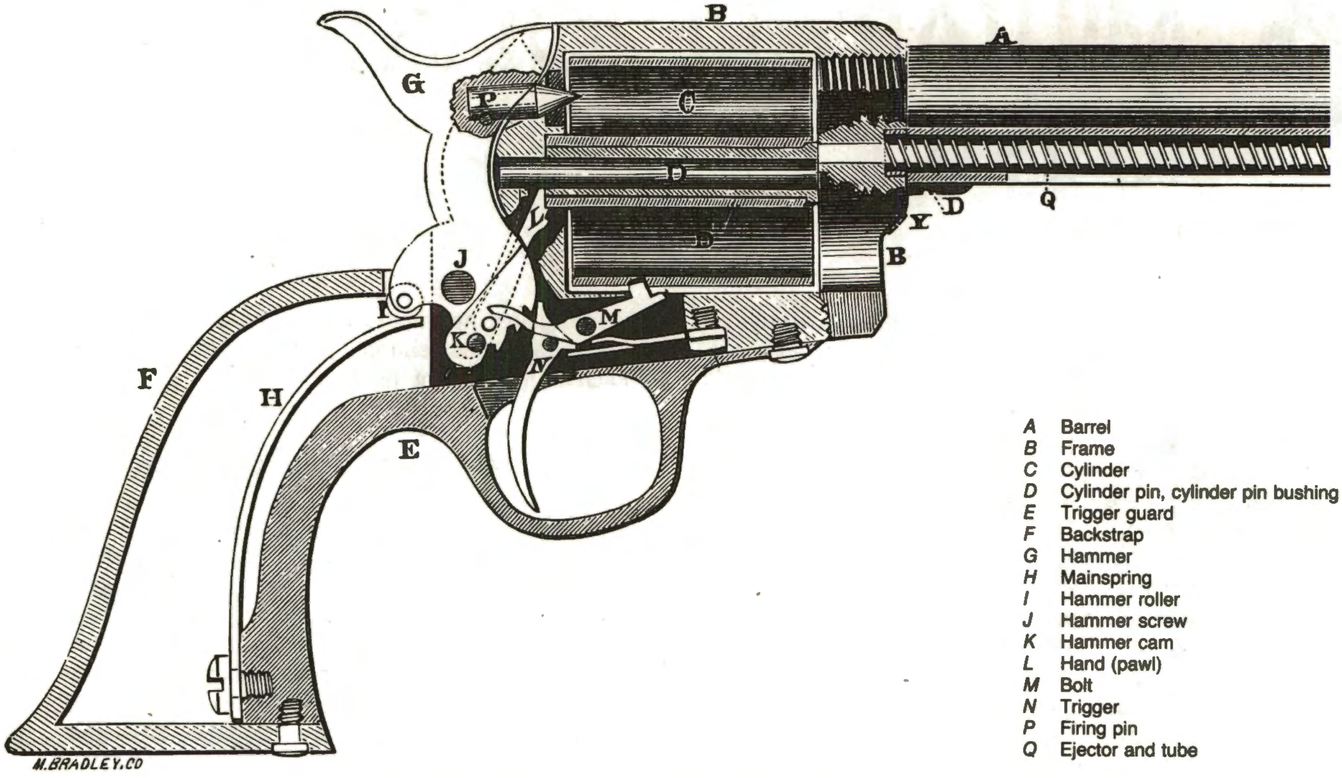
Nagant Double-Action

In the mid-1860s, this lock mechanism (fig. 2–3) was introduced in Europe. Because the Nagant brothers used it in their service revolvers, it is commonly called the Nagant lock, but its exact origin is obscured. Its principal novelty was the hinged hammer catch (b) attached (at point a) to the breast of the hammer (k). When the trigger was pulled in a double-action fashion, the nose (x) engaged the hammer catch and tipped the hammer backwards until the engagement was lost, thus permitting the hammer to fall. When cocking the hammer by thumb, the trigger nose engaged a full-cock notch (z) at the toe of the hammer. Pulling the trigger fired the weapon. Half-cock was obtained by using a special sear at the bottom of the hammer (projection u engaged notch z). A hump on the trigger (p) locked the cylinder by engaging the slot (t) on the cylinder at the instant of firing. The pawl (i) rotated the cylinder.

Lefaucheux-Francotte/Chamelot-Delvigne Double-Action

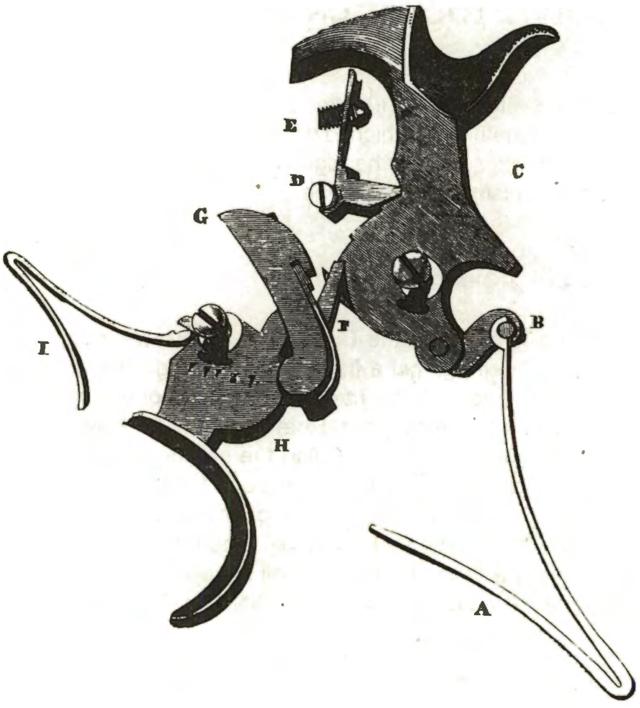
This lock mechanism (fig. 2–4) is an excellent design. Cocking by thumb involved only the bottom sear (J). A long sear (I) was engaged by a tooth on the hammer breast to pull the trigger back as the thumb cocked the hammer. For self-cocking fire, the long sear (I) engaged a notch in the breast of the hammer and rotated it to the rear. As in the Beaumont-Adams

*For a more detailed discussion of revolver lock mechanisms, see A. W. F. Taylerson's trilogy, *The Revolver.*



A Barrel
B Frame
C Cylinder
D Cylinder pin, cylinder pin bushing
E Trigger guard
F Backstrap
G Hammer
H Mainspring
I Hammer roller
J Hammer screw
K Hammer cam
L Hand (pawl)
M Bolt
N Trigger
P Firing pin
Q Ejector and tube

FIGURE 2–1. The lock mechanism of the Model 1873 Colt Single-Action Army. (*U.S. Army*)



A Mainspring
B Hammer swivel
C Hammer
D Short sear
E Short sear spring
F Long sear
G Lifter with spring (operates lifter and long sear)
H Trigger
I Trigger spring

FIGURE 2–2. The lock mechanism of the Beaumont-Adams percussion revolver. (*Dove*)

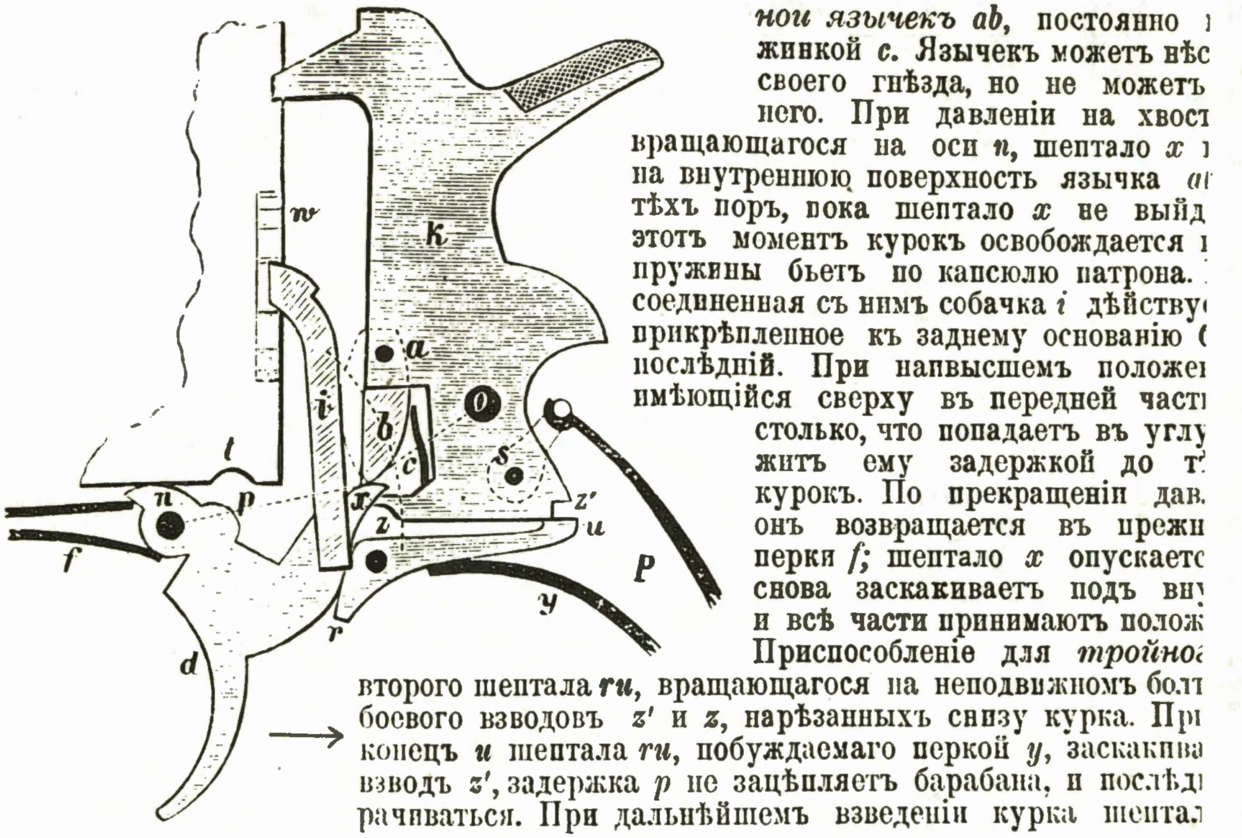


FIGURE 2–3. Lock mechanism of early Nagant revolvers. (*Budayevskii*)

a	Hammercatch pivot	*k*	Hammer	*s*	Hammer swivel
b	Hammercatch	*n*	Trigger pivot post	*t*	Cylinder bolt notch
c	Hammercatch spring	*o*	Hammer pivot point	*u*	Half-cock on sear
d	Trigger	*p*	Cylinder bolt	*x*	Double-action nose on trigger
f	Trigger spring	*P*	Mainspring	*y*	Sear spring
i	Hand (pawl)	*r*	Sear	*z*	Full-cock notch, half-cock notch

lock, the long sear was eventually forced out of engagement and the hammer fell.

Schmidt-Galand Double-Action

Charles-François Galand devised an improved Nagant-type lock that eliminated the multiplicity of springs involved in all previous locks. This lock mechanism (fig. 2–5) had a lever (3) that was hinged to the frame. The lever rested on the pawl (4). A flat spring (2) pushed against the lever to serve as both the trigger spring and the pawl spring. Galand thus substituted more durable parts for the fragile trigger and pawl springs. He had proposed in his patent application to use a **v**-shaped mainspring (the upper arms would have operated the hammer, while the lower would impinge upon the lever to operate the pawl and spring), but he abandoned the idea for two flat springs in his *revolver de guerre en 1873*.

Rudolph Schmidt, a noted Swiss arms designer, adapted the Galand **v**-spring concept for the Swiss Model 1878 and 1882 revolvers. This lock mechanism is often called the Chamelot, Delvigne, and Schmidt lock. The mainspring auxiliary, as Galand's lever is now designated, was adopted in many revolver designs. A few of the more significant ones include the Austro-Hungarian Modell 1898 Rast & Gasser, the Webley Mark I through Mark VI, and the Enfield .38 No. 2 Mark I. The Colt 1889, 1892, 1894 revolver series employed a much-modified version of the Schmidt-Galand mechanism.

Smith & Wesson Double-Action

After 1880, Smith & Wesson revolvers used a new lock, borrowing only the hammer catch from the Belgian-Swiss design. Unique points of the Smith & Wesson lock mechanism included a single-leaf mainspring and a coil-spring, sliding hammer-rebound mechanism. A hump on the hammer rebound struck the base of the hammer to back it off from the cartridge, thereby reducing the possibility of accidental discharges caused by an external blow to the hammer.

TABLE 2-1 CHARACTERISTICS OF STANDARD MILITARY REVOLVERS, 1870–1900

*Lock Type (Frame Type)**	*Model Designation*	*Country*	*Caliber*	*Overall Length (mm)*	*Barrel Length (mm)*	*Weight (grams)*	*Rifling/ Twist*	*Manufacturer(s)*
Colt single-action (2)	Colt Single-Action Army Revolver, Model 1873	United States	.45 (11.43mm)	318	191	1048	4-left	Colt Patent Firearms Manufacturing Co.
Colt single-action (1)	Reichsrevolver, Modell 1879 (cavalry or trooper's model)	Germany	10.55mm	310	183	103	4-right	Spangenberg & Sauer; Sauer & Sohn; C. G. Haenel; F. Dreyse; Royal Arsenal
Colt single-action (1)	Reichsrevolver, Modell 1883	Germany	10.55	260	126	920	4-right	Same as above
Smith & Wesson single-action (3)	Revol'ver sistemy Smita i Vessona, obrazets1871g (Smith & Wesson Model 1871), No. 1	Russia	.44 (11.18mm)	343	203	1135	5-right	Smith & Wesson
Smith & Wesson single-action (3)	Revol'ver sistemy Smita i Vessona, obrazets 1872g, No. 2	Russia	.44 (11.18mm)	318	178		5-right	Smith & Wesson
Smith & Wesson single-action (3)	Smith & Wesson Schofield Model 1875	United States	.45 (11.43mm)	318	178	1135	5-right	Smith & Wesson
Smith & Wesson single-action (3)	Revol'ver sistemy Smita i Vessona, obrazets 1880g, No. 3	Russia	.44 (11.18mm)	305	165		5-right	Smith & Wesson; Tulsa; Ludwig Loewe
Lefaucheux-Francotte double-action (2)	Modell 1870–74 Gasser (Trooper's model)	Austro-Hungary	11.3mm (11mm Montenegrin)	375	235	1520	6-right	Gasser
Lefaucheux double-action (2)	Modell 1878 Gasser-Kropatschek Infanterie-offiziersrevolver	Austro-Hungary	9mm	230	120	765	6-right	Gasser
Chamelot-Delvigne (1)	Modèle 1871 (Trooper's revolver)	Belgium	11mm				7-right	
Lefaucheux-Francotte (1)	Revolver m/1871	Sweden	11mm	307	150	1170	7-right	A. Francotte; Husqvarna
Lefaucheux-Francotte (1)	Model 1871	Denmark	11mm (pin-fire)	257	128	970	7-right	A. Francotte
Lefaucheux-Francotte (1)	Model 1871/1881	Denmark	11mm (center-fire)	257	128	970	7-right	Navy Yard, Copenhagen
Chamelot-Delvigne-Schmidt (2)	Ordonnanz revolver Modell 1872	Switzerland	10.4mm (rim-fire)	277	155	1050	4-right	Pirlot Bros.
Chamelot-Delvigne-Schmidt (2)	Ordonnanz revolver Modell 1872/78 (conversion to center-fire)	Switzerland	10.4mm (center-fire)	272	150	1050	4-right	Bros.

*Lock Type (Frame Type)**	*Model Designation*	*Country*	*Caliber*	*Overall Length (mm)*	*Barrel Length (mm)*	*Weight (grams)*	*Rifling/ Twist*	*Manufacturer(s)*
Chamelot-Delvigne-Schmidt (2)	Modello 1872 Chamelot Delvigne (service revolver)	Italy	10.35mm	286	159	1134	4-right	Siderugica Glisenti; Real Fabbrica d'Armi
Chamelot-Delvigne (2)	Revolver Modèle 1873	France	11mm	240	115	1040	4-right	St. Etienne
Chamelot-Delvigne (2)	Revolver d' Officier Modèle 1874	France	11mm	240	115	1040	4-right	St. Etienne
Beaumont-Adams (2)	Pistol, Breech-Loading Revolver, Tranter, Mark I	Great Britain	.450 (11.43mm)	304	152	1120		William Tranter
Nagant double-action (2)	Modèle 1878	Belgium	9mm	267	140	940	4-right	Nagant Bros.
Nagant single-action (2)	Modèle 1883 (NCO's, trumpeter's, and artillery model)	Belgium	9mm	267	140	940	4-right	Nagant Bros.
Nagant double-action (2)	Nagant selvspenner revolver for offiserer og underoffiserer M/1883	Norway	9mm	267	140	940	4-right	Nagant Bros.
Nagant double-action (2)	Modelo 1885	Brazil	9.4mm				4-right	Nagant Bros.
Nagant double-action (2)	Svensk officersrevolver m/1887	Sweden	7.5mm	237	114	800	4-right	Nagant Bros.; Husqvarna
Nagant double-action (2)	Nagant Revolver M/1893	Norway	7.5mm	228	113	830	4-right	Nagant Bros.; Husqvarna; Kongsberg;
Nagant single- and double-action gas-seal (5)	Revol'ver sistemy Nagana obrazets 1895g	Russia	7.62×25mm	230	110	790	4-right	Nagant Bros.; Tula
Chamelot-Delvigne (1)	Model 1865	Denmark (Navy)	11mm (pin-fire)	255	128	870	7-right	A. Francotte
Chamelot-Delvigne (1)	Model 1865/97 Centralteanding	Denmark	11.45mm (center-fire)	255	128	870	7-right	Kronberg did conversions
Lefaucheux (2)	Revolver Modèle Modifie N.	France	11mm	239	121	1050	7-right	St. Etienne
Lefaucheux-Francotte (1)	Revolver m/1879 (m/1863 converted to center-fire)	Sweden	11mm	305	158	1015	7-right	E. Lefaucheux
Lefaucheux-Francotte (1)	Model 1882 (trooper's model)	Denmark	10.9mm				7-right	A. Francotte
Lefaucheux (1)	Modelo 1883 (trooper's model)	Spain	11mm (pin-fire)				7-right	
Chamelot-Delvigne (2)	Revolver m/1884 (French Mle. 1873)	Sweden	11.4mm (11mm Fr.)	240	115	1040	4-right	St. Etienne

CHARACTERISTICS OF STANDARD MILITARY REVOLVERS, 1870–1900—Continued

*Lock Type (Frame Type)**	*Model Designation*	*Country*	*Caliber*	*Overall Length (mm)*	*Barrel Length (mm)*	*Weight (grams)*	*Rifling/ Twist*	*Manufacturer(s)*
Lefaucheux-Francotte (1)	Model 1886 (trooper's model)	Denmark	9.5mm				7-right	A. Francotte
Chamelot-Delvigne (2)	Pistola a Rotazione, System Bodeo Modello 1889	Italy	10.35mm	216–235	89–114	797–910	4-right	Castelli; Metallurgica a Tempini; Siderurgica Glisenti; Real Fabbrica d' Armi; Bernadelli
Chamelot-Delvigne double-action (4)	Modèle d' Ordonnance 1892	France	8mm Lebel	235	114	850	4-right	St. Etienne
Lefaucheux-Francotte (1)	Model 1891	Denmark	9mm	260	137	900		J. B. Ronge Fils; A. Francotte
Galand (Galand)	Model 1868 Revolver Galand a extracteur automatique	Russia	10.4mm	240	124	1090	12-left	Nagant Bros.; Tula
Schmidt-Galand (2)	Ordonnanzrevolver Modell 1878	Switzerland	10.4mm	280	116	1000	4-right	Waffenfabrik Bern; SIG
Schmidt-Galand (3)	Pistol, Revolver, B. L., Enfield (Mark I), interchangeable (1880)	Great Britain	.476 (12mm)	292	149	1148	7-right	Small Arms Factory
Schmidt-Galand (3)	Pistol, Revolver, B. L., Enfield (Mark II), interchangeable (1882)	Great Britain	.476 (12mm)	291	149	1150	7-right	Royal Small Arms Factory
Schmidt-Galand, (2)	Ordonnanzrevolver Modell 1882	Switzerland	7.5mm	235	115	780	4-right	Waffenfabrik Bern; SIG
Schmidt-Galand (3)	Revolver, Webley .455 inch, Mark I	Great Britain	.445 (11.5mm)	240	102	990	7-right	P. Webley & Sons
Schmidt-Galand (4)	Model 1889 New Navy Revolver	United States	.38 (9mm)	292	152	936	6-left	Colt
Schmidt-Galand (4)	Model 1892 New Navy Revolver	United States	.38 (9mm)	246	102		6-left	Colt
Schmidt-Galand (3)	26 Nen Shiki Kenju (Type 26 Revolver, 1893)	Japan	9mm	216	120	880	4-right	gov't. arsenals
Schmidt-Galand (4)	Model 1892, 1894, 1896, 1901, 1903 New Model Army Revolver	United States	.38 (9mm)	292	152	936	6-left	Colt
Schmidt-Galand double-action (2)	Modell 1898 Rast & Gasser Revolver	Austro-Hungary	8mm	228.6	114.3	936	4-right	Gasser
Schmidt-Galand (4)	Model 1905 Marine Corps Revolver	United States	.38mm (9mm)	273	152	921	6-left	Colt

Lock Type (Frame Type)*	Model Designation	Country	Caliber	Overall Length (mm)	Barrel Length (mm)	Weight (grams)	Rifling/ Twist	Manufacturer(s)
Smith & Wesson double-action (3)	**Modelo 1884 (officer's revolver)**	**Spain**	**.44 (11mm)**				**5-right**	**Orbea Hermanos**

*1. solid frame, cylinder-fixed with non-mechanical ejection
2. solid frame, cylinder-fixed with mechanical (rod) ejection
3. top-break hinged frame with latch
4. solid frame, swing-out cylinder, multiple ejection
5. solid frame, gas-deal cylinder system (variant of 2)
For information on other Webley models, see page 81.

When the trigger of the Smith & Wesson lock was pulled, a projection at the rear of the trigger engaged the underside of a hinged, spring-loaded arm on the hammer (after the Nagant design). A stud at the front of the trigger engaged a notch in the cylinder locking bolt. As the trigger rotated to the rear, it pulled down the cylinder locking bolt, permitting the cylinder to be rotated by the hand (the hand was connected to the trigger). The hammer was rotated to the rear by the trigger projection, thus forcing the hammer arm forward. When the next chamber was aligned, the cylinder bolt snapped into a slot on the outside of the cylinder, locking it. The projection on the trigger rode off the end of the hammer arm, releasing the hammer. The trigger was then released, permitting the trigger projection to force down the spring-loaded arm. The projection slipped under the arm, and at the same time the stud at the front of the trigger was allowed to reengage the notch in the cylinder bolt.

CARTRIDGE REVOLVERS IN THE ARMY

Lefaucheux is a name generally associated with inexpensive pin-fire revolvers of questionable quality, but Casimir Lefaucheux holds an important place in the history of handguns because his was the first practical handgun—a pepperbox—designed to take a self-contained cartridge. Casimir's son Eugene was the first to adapt a revolver for pin-fire ammunition. Eugene's French patent (15 April 1854) precedes Rollin White's by just one year. The pin-fire cartridge gets its name from the pin that protrudes through the side of the cartridge case. Inside the case, it rests against a fulminate compound that is detonated when the revolver's hammer strikes the external end of the pin.

Following more than three years of tests, the French navy adopted the 10.7mm Lefaucheux Modèle 1858 pin-fire, sin-

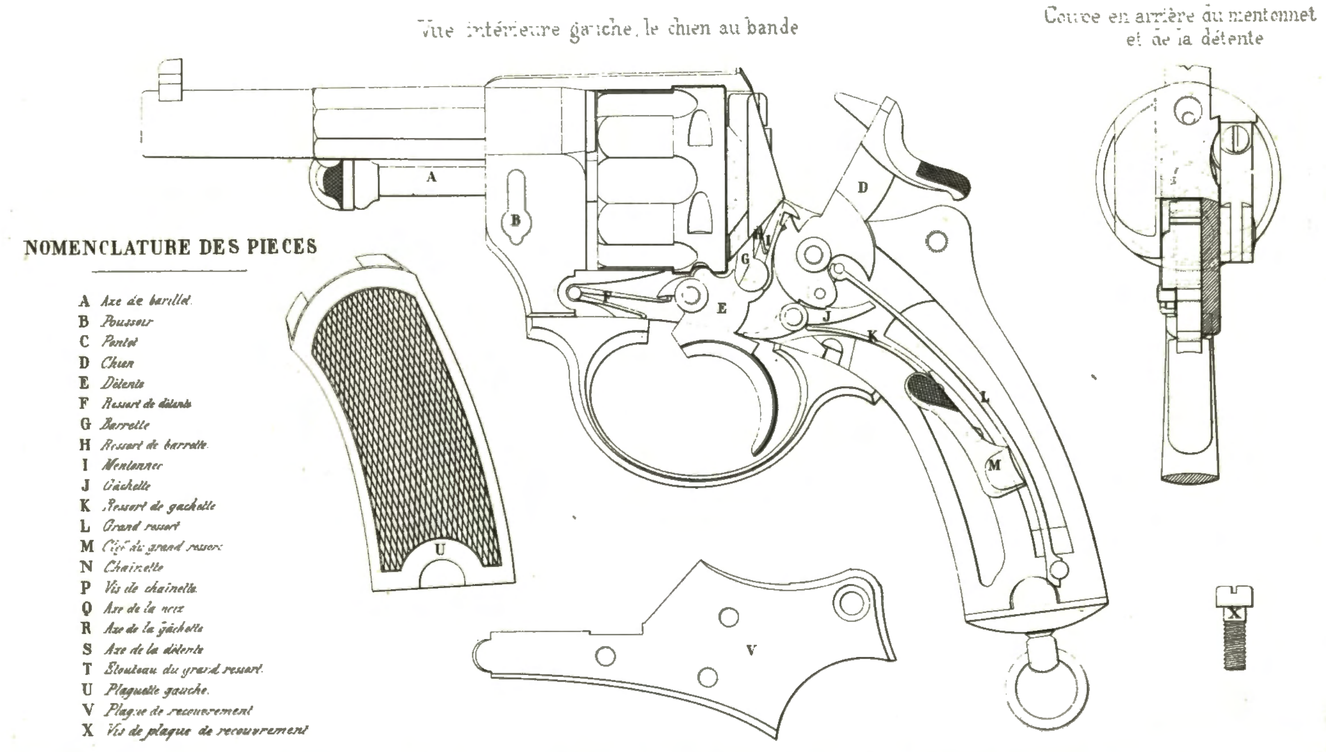


FIGURE 2–4. The Chamelot-Delvigne lock mechanism as utilized in the design of the French *Revolver d' Officier Modèle 1874*. (*French Army*)

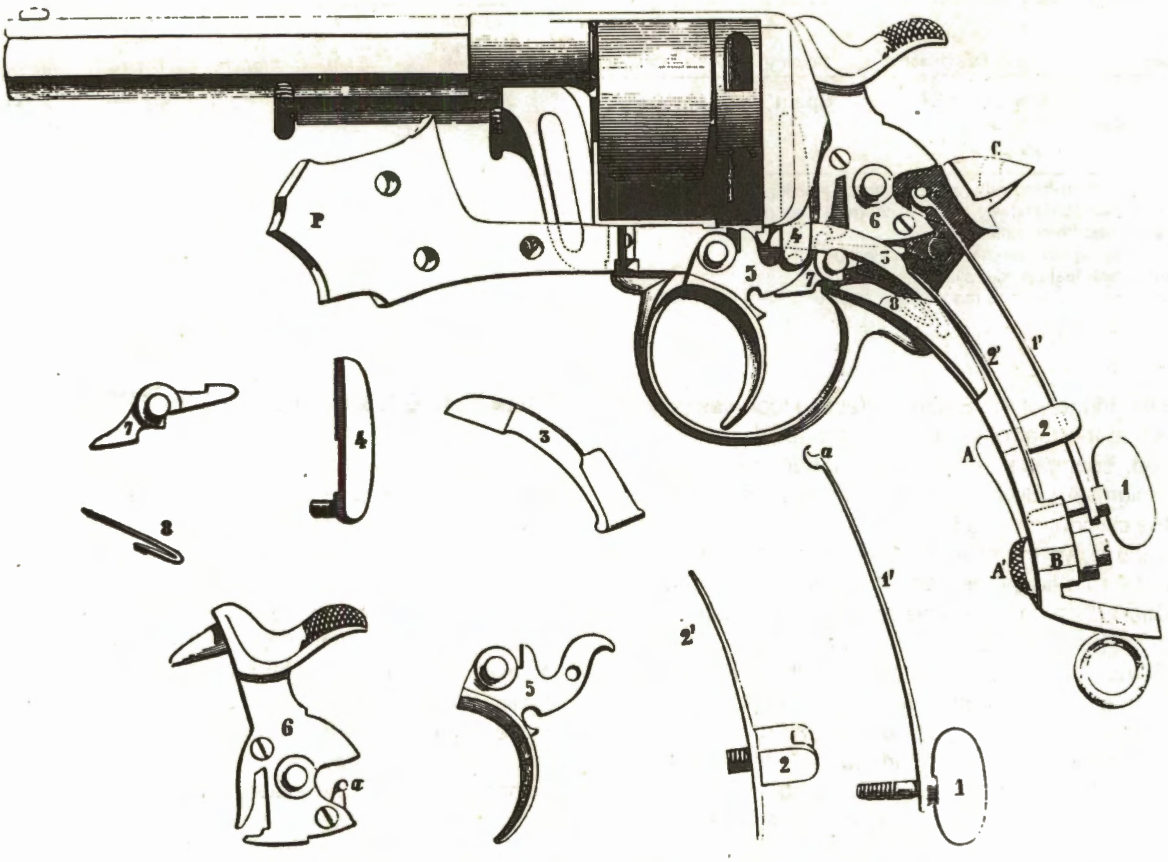


FIGURE 2–5. The Galand lock mechanism. (*Galand*)

1	Mainspring adjustment screw	*4*	Hand (pawl)
1'	Mainspring	*5*	Trigger
2	Mainspring auxiliary spring holder	*6*	Hammer
2'	Mainspring auxiliary spring	*7*	Sear
3	Mainspring auxiliary	*8*	Sear spring

gle-action revolver in 1858. The navy needed a handgun that would be less easily put out of commission by the humid conditions encountered at sea. Naval officials wanted their boarding parties to have a reliable revolver and led the switch from percussion handguns to cartridge revolvers. The *Modèle 1858* became the first metallic cartridge handgun to be officially adopted by any armed service. Sweden and Spain (1863) and Norway (1864) followed the French lead and adopted the Lefaucheux, too. Large numbers were also exported to the United States during the 1861–1865 Civil War.

After a dozen years of experience with the Lefaucheux, the French navy adopted a double-action, center-fire version of this revolver. Commonly called the Modèle 1858 Navy Revolver Transformed, its official designation was *Revolver Modèle 1870, Modifie N.* Lefaucheux started a trend, and soon armies all over the world were adopting center-fire revolvers.

American Military Revolvers, 1870 to 1900

American military leaders may have been slow to appreciate the utility of the cartridge-firing revolver, but their subordinates in the field were not. After the Civil War, large numbers of Colt and Remington (introduced in 1863) percussion revolvers continued in service, but by the late 1860s junior officers and enlisted men were beginning to demand better handguns. "R. A." sent a letter to the editor of the *Army and Navy Journal* in the spring of 1867.

> Sir: It is passing strange that while so much is being done in the way of perfecting the rifle and carbine, we hear nothing of an improved Army pistol. There are as many different pocket pistols, revolvers, and repeaters as there are breech-loading rifles, but most of them are poor affairs for troops, and Colt's and Remington's Army pistols are still the best we have for the service; but we greatly need a better weapon of this kind. We want a pistol to use the metallic cartridge, of the calibre to be adopted for the new carbines (.45 or .50); or the Colt Remington pistols might be altered to use metallic explosive cartridges, by cutting off the rear of the cylinder, so as to make it similar to Smith & Wesson's pistol cylinders; shortening the space in which the cylinder plays, and altering the hammer slightly. Everyone in the Army knows the great inconvenience of loading and capping an army pistol while in motion on horseback, and also the great number of pistol cartridges that are destroyed in the cartridge box, and in loading. With the metallic cartridge this waste does not occur.[1]

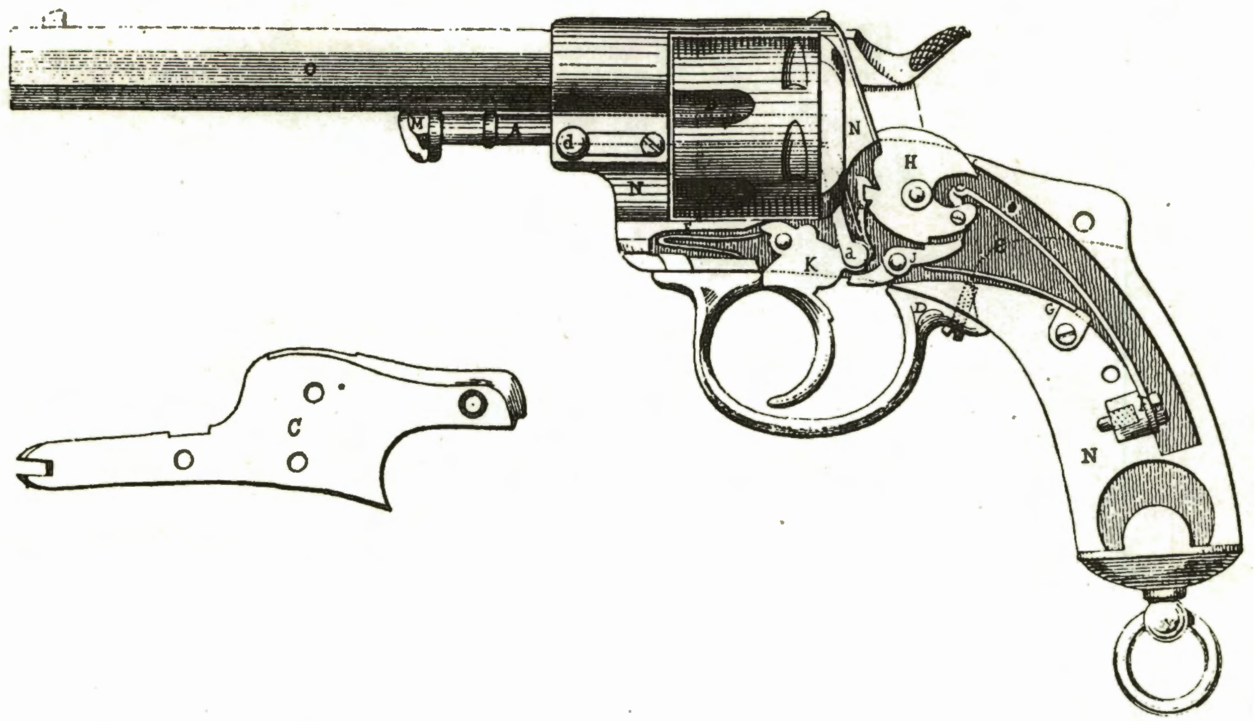


FIGURE 2–6. The lock mechanism of the Modell 1872 Chamelot, Delvigne, and Schmidt Swiss rimfire revolver. (*Galand*)

A	Cylinder pin	*J*	Sear
C	Sideplate	*K*	Trigger
D	Trigger guard	*M*	Cylinder pin latch
F	Mainspring	*N*	Frame
G	Sear spring	*O*	Barrel
H	Hammer		

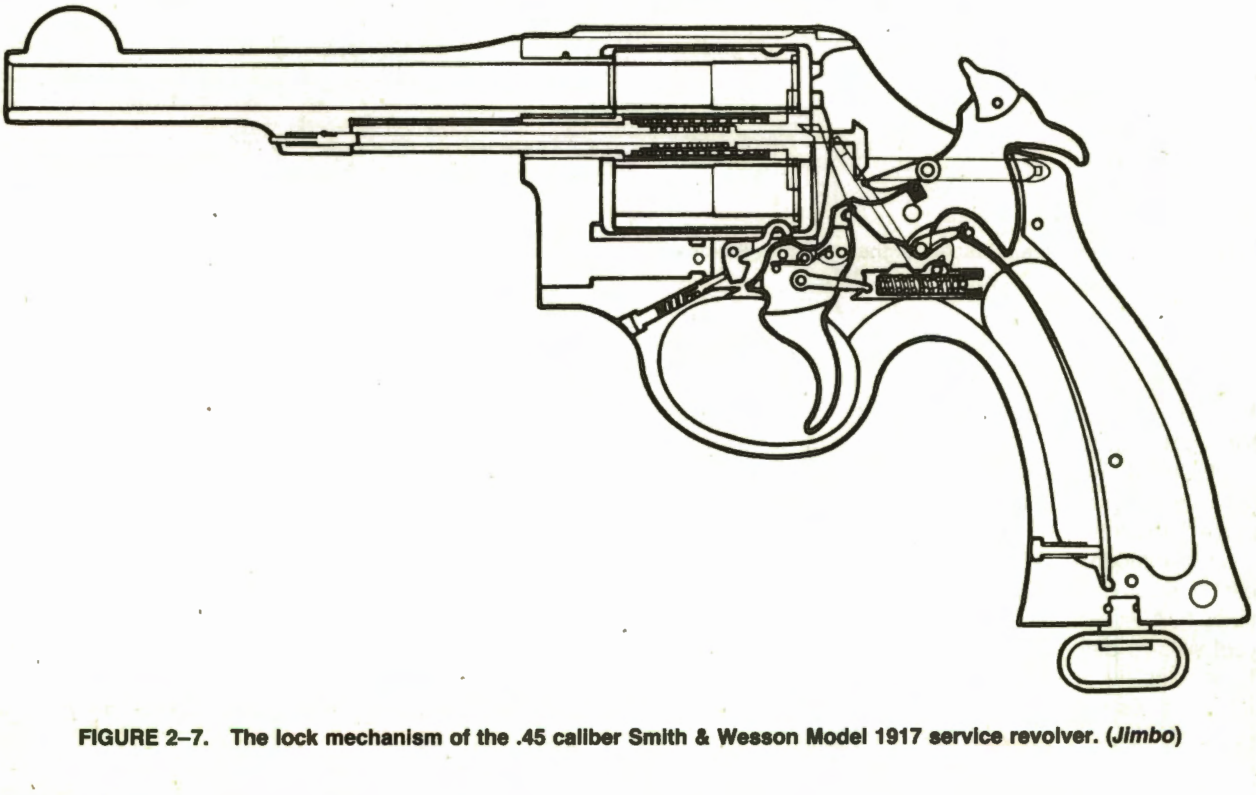


FIGURE 2–7. The lock mechanism of the .45 caliber Smith & Wesson Model 1917 service revolver. (*Jimbo*)

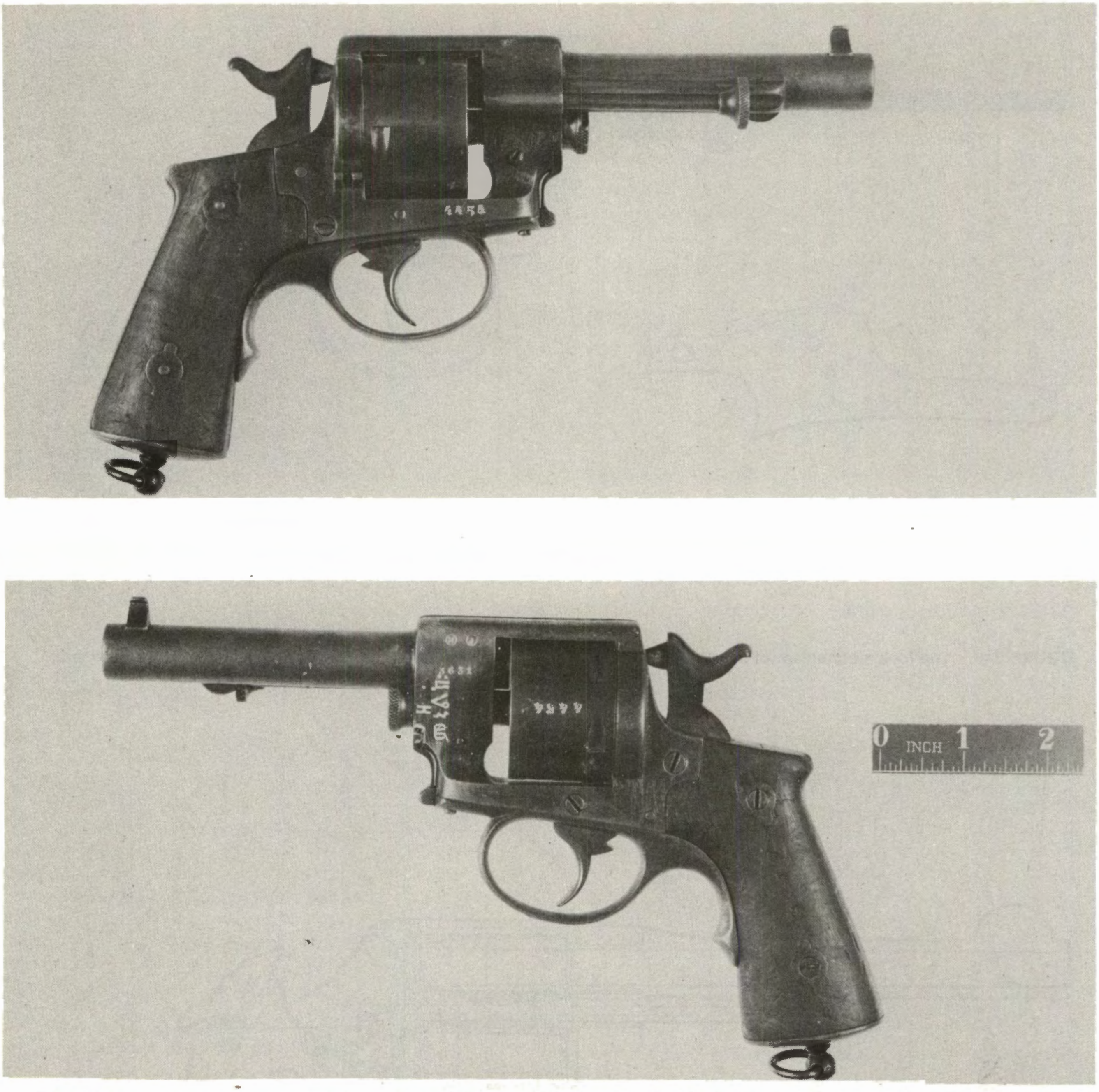


FIGURE 2–8. The Lefaucheux-designed 10.7mm *Revolver Modèle 1870 Modifie N.* as used by the French navy. (*Aberdeen*)

The Remington appears to have been the first percussion revolver converted to fire cartridges to find its way into the hands of United States troops. This apparently was done under a license granted by Rollin White to the U.S. Army Ordnance Department in 1869. The Union Metallic Cartridge Company produced a .46 caliber (11.68mm) metallic cartridge for this converted revolver. Attempts by Colt engineers to employ F. Alexander Thuer's front-loading cartridge to circumvent White's patent were never successful or popular.[2]

The availability of Remington cartridge revolvers led to criticism of the continued issuance of the percussion model. The editor of *Army and Navy Journal* commented on 25 September 1869.

> Officers of the Cavalry regiments stationed in the Indian country complain that many of the arms issued by the Government to their commands do not come up to the standard of efficiency which the peculiar nature of frontier service demands. . . . The Remington revolver, adopted as the standard arm of the service, also comes in for its share of censure, at least those belonging to the first and imperfect issue of several years ago. . . . The Remington revolver of *recent* issue [of the cartridge-type] is an undeniably good weapon. Its range is great and it can be relied on for accuracy. It is the old issue [the percussion-type] to which exceptions are taken.[3]

Editorial criticism did not, however, speak as loudly or as directly to army officials as did combat difficulties. Captain William J. Fetterman and his force—49 infantry, 27 cavalryman, 2 civilians—were annihilated by a band of Sioux in less than an hour on 21 December 1866 near Fort Phil Kearny. Only 29 of Fetterman's men had been armed with repeaters (27 were .52 caliber [13.2mm] Spencer rifles and 2 were .44 caliber [11.18mm] Henry rifles). His force was also divided during the fight, so those modern weapons they did have could not be used with real effect. At the Wagon Box fight, again near Fort Phil Kearny, on 2 August 1867, Captain James W. Powell and 31 compatriots equipped with .50 caliber (12.7mm) breech-loading rifles drove off a much superior force. On 17 September 1868, Major George A. Forsyth and 50 scouts successfully defended themselves against 600 to 700 Pawnees and Cheyennes at the Arikara River in the Colorado territory. Again, the difference was the Spencer rifle and the Colt percussion revolver. (The addition of the cartridge revolver would have added even more efficiency.)

THE ARMY EVALUATES NEW WEAPONS Incidents such as these on the frontier battlefield prompted the creation of a Small Arms and Accoutrements Board, which convened early in 1870 at St. Louis, Missouri. In the handgun class, the following weapons were submitted for evaluation: Remington .44 caliber (11.18mm) revolvers (percussion and four-cartridge variations); the Smith & Wesson Model 3 American First Model .44 caliber (11.18mm) Henry rim-fire; several Whitney and National Arms revolvers; and the Remington .50 caliber (12.7mm) single-shot pistol (later the Model 1871). Colt submitted no handguns at this time. The board's findings were reported in *Army and Navy Journal* on 23 July 1870.

> The Remington is the only single-barrelled pistol submitted. It is an excellent weapon but should be so modified as to load at the half-cock.
>
> The Smith & Wesson is decidedly superior to any other revolver submitted. It should be modified as follows, viz.: made centre fire; the cylinder lengthened so as to close the space in

FIGURE 2–9. The Remington New Model Army single-action percussion revolver. Manufactured between 1863 and 1875, nearly 132,000 were produced. (*Tokoi*)

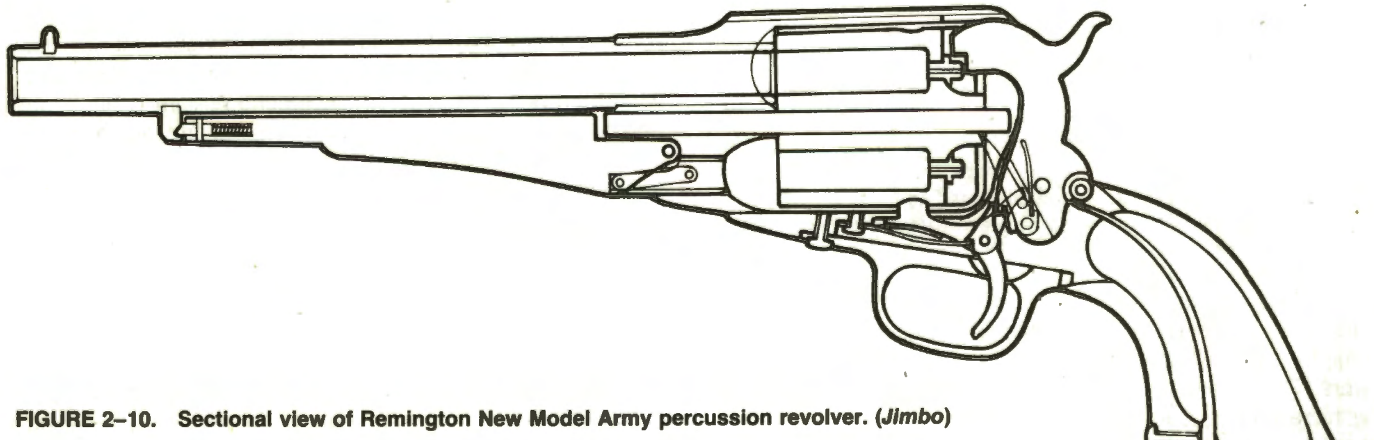
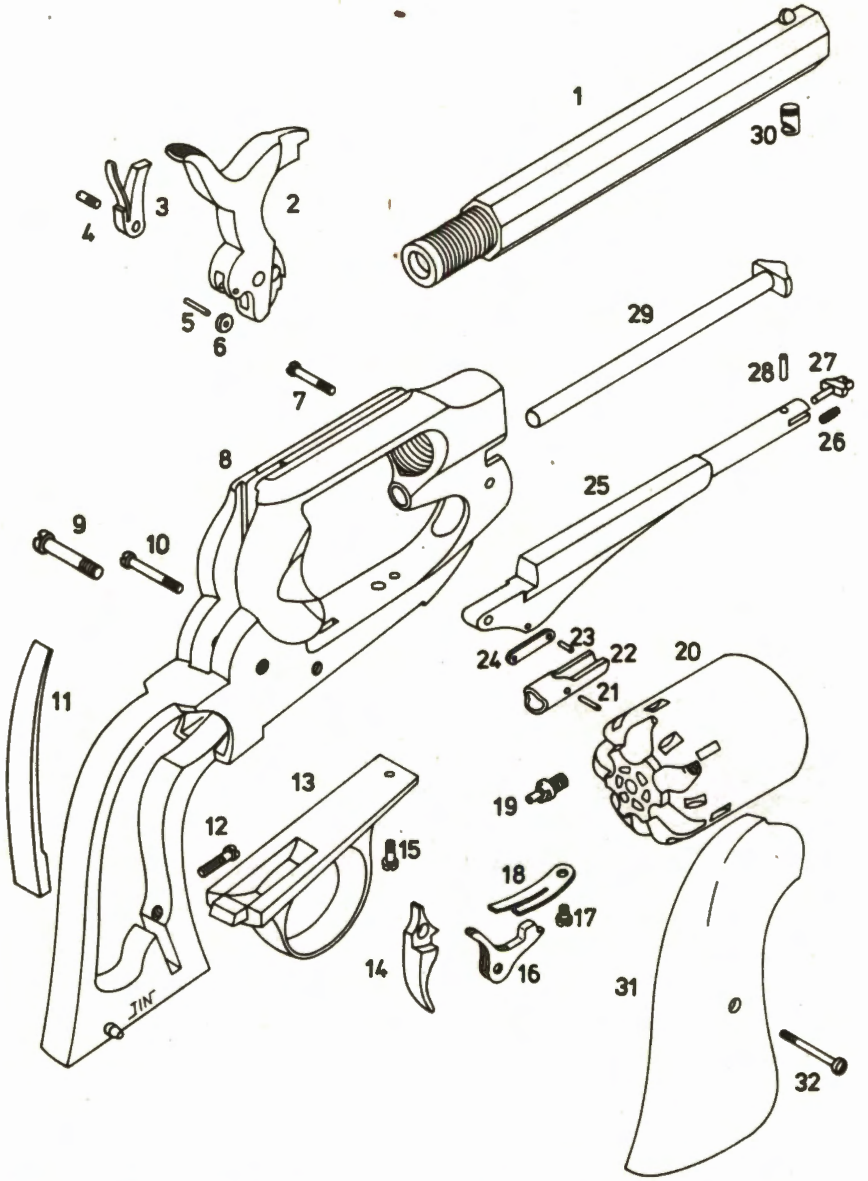


FIGURE 2–10. Sectional view of Remington New Model Army percussion revolver. (*Jimbo*)



1 Barrel
2 Hammer
3 Pawl and pawl spring
4 Pawl screw
5 Hammer roll pin
6 Hammer roll
7 Loading lever screw
8 Main frame
9 Hammer screw
10 Trigger and cylinder stop screw
11 Mainspring
12 Mainspring set screw
13 Trigger guard
14 Trigger
15 Trigger guard screw
16 Cylinder stop
17 Trigger and cylinder stop spring screw
18 Trigger and cylinder stop spring
19 Nipple (x 6)
20 Cylinder
21 Rear plunger link pin
22 Plunger
23 Front plunger link pin
24 Plunger link
25 Loading lever
26 Latch spring
27 Latch
28 Latch pin
29 Cylinder pin
30 Barrel latch stud
31 Pistol grip (2)
32 Pistol grip screw

FIGURE 2–11. Exploded view of the Remington New Model Army percussion revolver. (*Jimbo*)

> front of the breech-block, and counter sunk to cover the rim of the cartridge; calibre increased to the standard.
>
> Pistols and revolvers should have the "saw-handle" so shaped that in bringing the weapon from the holster to an aim, it will not be necessary to change the first grasp or bend the wrist.
>
> When time will permit, cavalry troops should be instructed in the use of all these arms; and all should be kept on hand with small bodies on the frontier, where every variety of cavalry service may be required.[4]

The Remington single-shot, the first choice of pistol, was singularly inappropriate for Indian warfare, but as noted in chapter 1 these handguns were intended for European-style wars. The board's report commented that "cavalry armed with the sabre should have one or two single-barrelled pistols as a substitute for the carbine" and that "cavalry armed with the carbine should have a revolver as a substitute for the sabre." In other words, where sabers were appropriate, the Remington pistol would do instead of the single-shot carbine. The chief of ordnance, Brevet Major General A. B. Dyer, whose views were approved by General William T. Sherman and the secretary of war, recommended the purchase of 1,000 .50 caliber (12.7mm) Remington single-barrelled pistols and 1,000 .44 caliber (11.18mm) Smith & Wesson revolvers. Another 1,000 .44 caliber (11.18mm) Remingtons would be modified and issued for service trials. While details of the several Remington alterations are not known, it may be assumed that the model selected was the one Remington subsequently advertised as the *Improved Army Model.*

D. B. Wesson and Horace Smith changed their Model 3 revolver to center-fire, calling the new cartridge it used the Smith & Wesson .44/100 (11.18mm). Samples of the modified pistol were sent to their dealers, the U.S. Army, and General Aleksandr P. Gorlov, a Russian military attache who was purchasing arms for his country while visiting the United

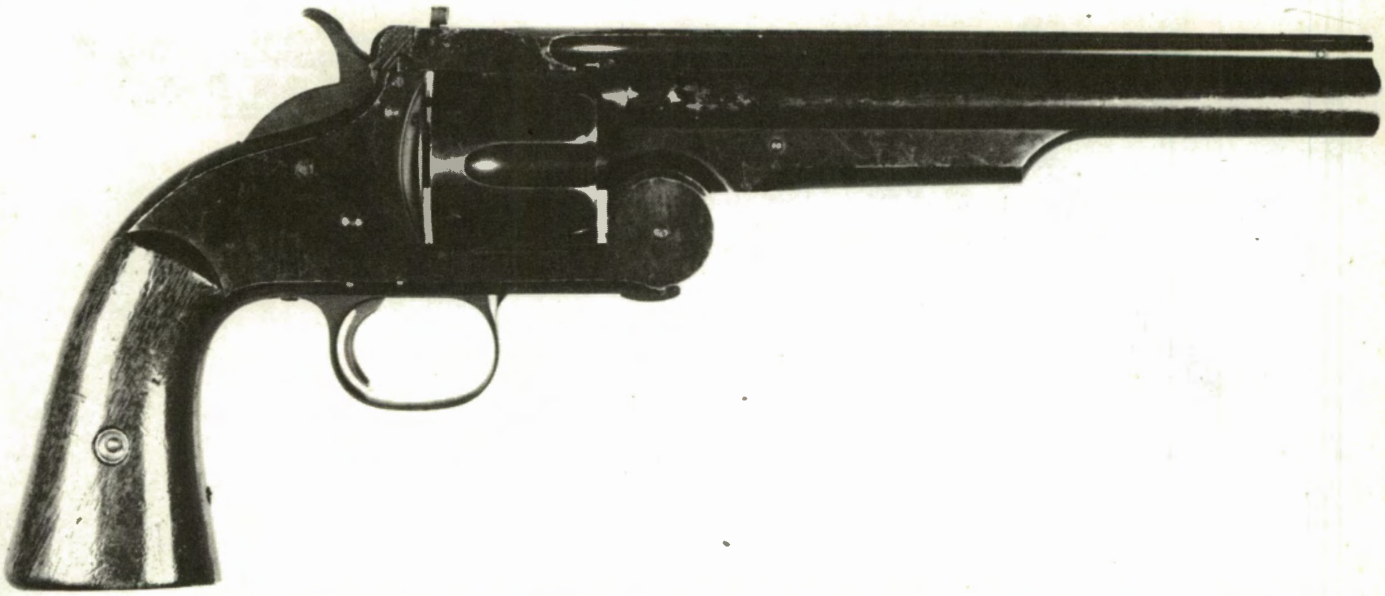


FIGURE 2–12. Smith & Wesson .44 caliber rim-fire Model 3 American First Model. This is the patent model from the Smithsonian collection. (*Smithsonian*)

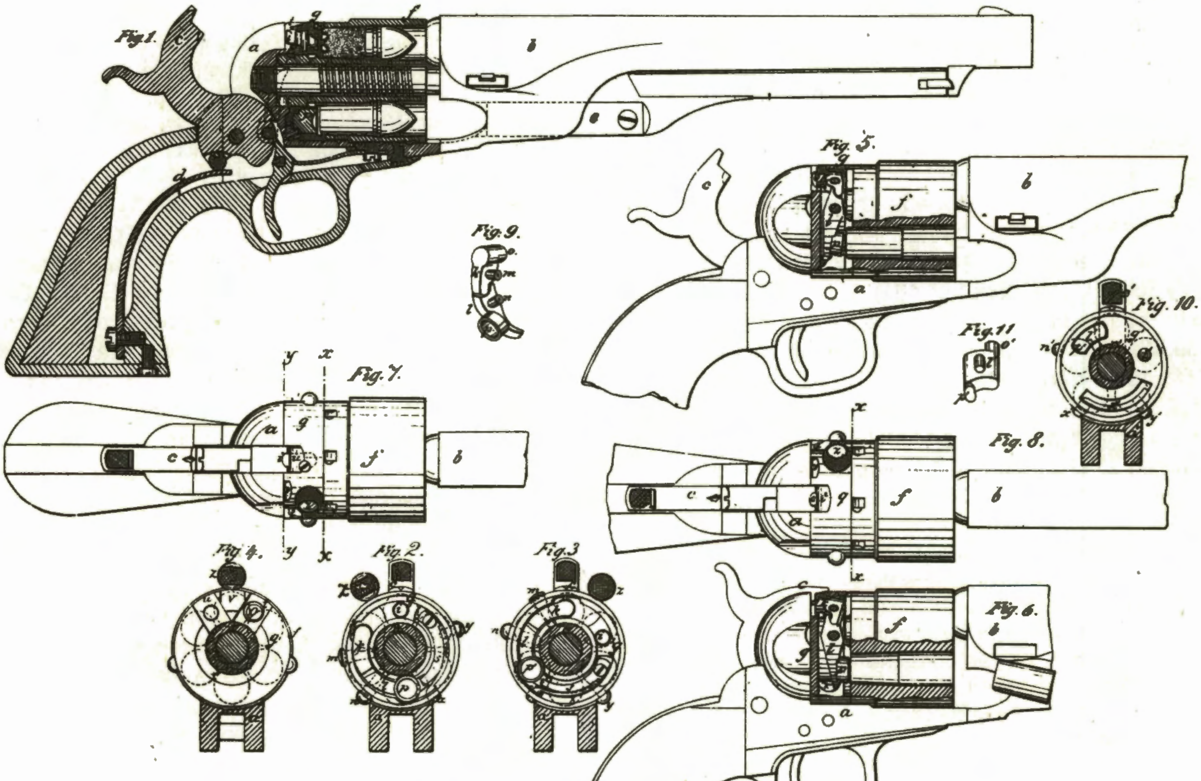


FIGURE 2–13. The first factory alteration of the percussion Colt revolver for metallic cartridges was developed by F. Alexander Thuer, patented in the United States on 18 September 1868 (number 82,258) and in Britain on 31 December 1868 (number 3,981). Designed to circumvent Rollin White's patent, the cylinder was loaded with a tapered cartridge from the front. The percussion cylinder was modified at its base to accept an adapter ring. The firing pin on the hammer struck the primer of the cartridge through an aperture in the adapter ring. (*U.S. Patent Office*)

FIGURE 2–14. Colt Thuer-type cartridge version of Model 1860 Army revolver. (*Colt*)

States. On 28 December 1870, Smith & Wesson received a contract for 1,000 Model 3s, which they delivered to Springfield Armory in March 1871.

No information is available regarding the delivery of the converted Remington revolvers during this period, but the transition from percussion to metallic cartridges was well underway by 1871. The annual report of the chief of ordnance for that year noted: "A small number of revolvers (pistols) which use the primed metallic cartridge, have been made and issued to troops, and the few reports upon them which have been received at this Bureau show that they are greatly superior to the revolvers which used the paper cartridges, and must supersede them in the service. As soon as a proper model can be selected it should be adopted."[5]

Charles B. Richards developed a process for altering the Colt .44 (11.18mm) Army revolver from percussion to cartridge that was patented in his name by the Colt Company on 25 July 1871 (U.S. patent 117,461). This modified revolver was the forerunner of the Colt open-top .44 caliber (11.18mm) Cartridge Model 1872, which was soon replaced by the .45 caliber (11.43mm) Army Model 1873. There is evidence that both of Richards' preliminary models were issued by the army. In an initial report on the Model 1873 from Springfield Armory dated 27 December 1872, Captain John R. Edie assessed the new Colt.

> The new model Colt's revolver is not an alteration of their old revolver for paper cartridges, as is the model now in service. It is made with a solid frame, inclosing the cylinder, and into which the barrel is screwed. The cylinder is of greater diameter, and a little shorter than the old one. The hand which rotates the cylinder is an improvement, having two fingers, one of which reinforces the other, giving a considerable gain of power. The ejector is similar to the old one, but one end of the ejector tube is set in the frame, the other being fastened to the barrel by a screw. The base pin is held by a screw through the frame.
>
> This revolver is supplied with a safety notch, on which it can be carried without the firing pin touching the cartridge. The other parts are essentially the same as in the old model.[6]

Captain Edie clearly distinguished between "the model now in service"—the Richards conversion—and the Model 1873. The open-top Model 1872, a transitional design rather than an alteration, is also described in a 7 February 1873 supplementary report.

> To distinguish between this revolver and the one reported upon December 27, 1872, I will call the latter No. 1 and the former No. 2 [i.e., No. 1 = Model 1872 and No. 2 = Model 1873].
>
> Colt's No. 2 is like No. 1 in the "lock," "hammer," "cylinder stop" and "revolving finger," but like the old model (now in service) in the general form of its frame and barrel. Its extreme length is about .5" [12.7 millimeters] less than that of the old model, and it is 3.5 ounces [99 grams] lighter. It is also about 1.5 ounces [43 grams] lighter than No. 1 (new model). It has no firing pin, the cartridge being struck directly (the same as in No. 1) by the point of the hammer.[7]

Why Colt tried to sell the army the two-piece-frame Model 1872 can only be speculated. In 1868 the army had said that new revolvers should have solid frames. But the Colt manufacturers had a lot of capital tied up in existing production dies, jigs, and fixtures; so it is possible that Richard W. H. Jarvis, Colt Company president, 1865–1901, was trying to save money. But the Model 1872 did not sell very well, and only about 7,000 were manufactured between 1872 and 1873.

Captain Edie also compared the two Colts with the Smith & Wesson Model 3. For purposes of early tests, all three revolvers were chambered for .44 caliber (11.18mm) service ammunition. Edie reported that on firing each of the pistols for a minimum of 800 rounds the Colt functioned better throughout. The Smith & Wesson tended to clog and was difficult to dismount for cleaning, while the Colt had "fewer, simpler and stronger parts, not subject to as great stress as in the Smith & Wesson, whose only superiority noted was its speed of ejecting empty cartridges." In firing for accuracy, the Colt had a mean absolute deviation at 46 meters of 79 millimeters, compared to 112 millimeters for the Smith & Wesson, and for penetration an average at 23 meters of 104 millimeters for the Colt and 85 millimeters for the Smith & Wesson. Edie went on to say that the Colt Model 1873 had a "slightly better" record for accuracy and penetration, but the general working of the Model 1872 was the more satis-

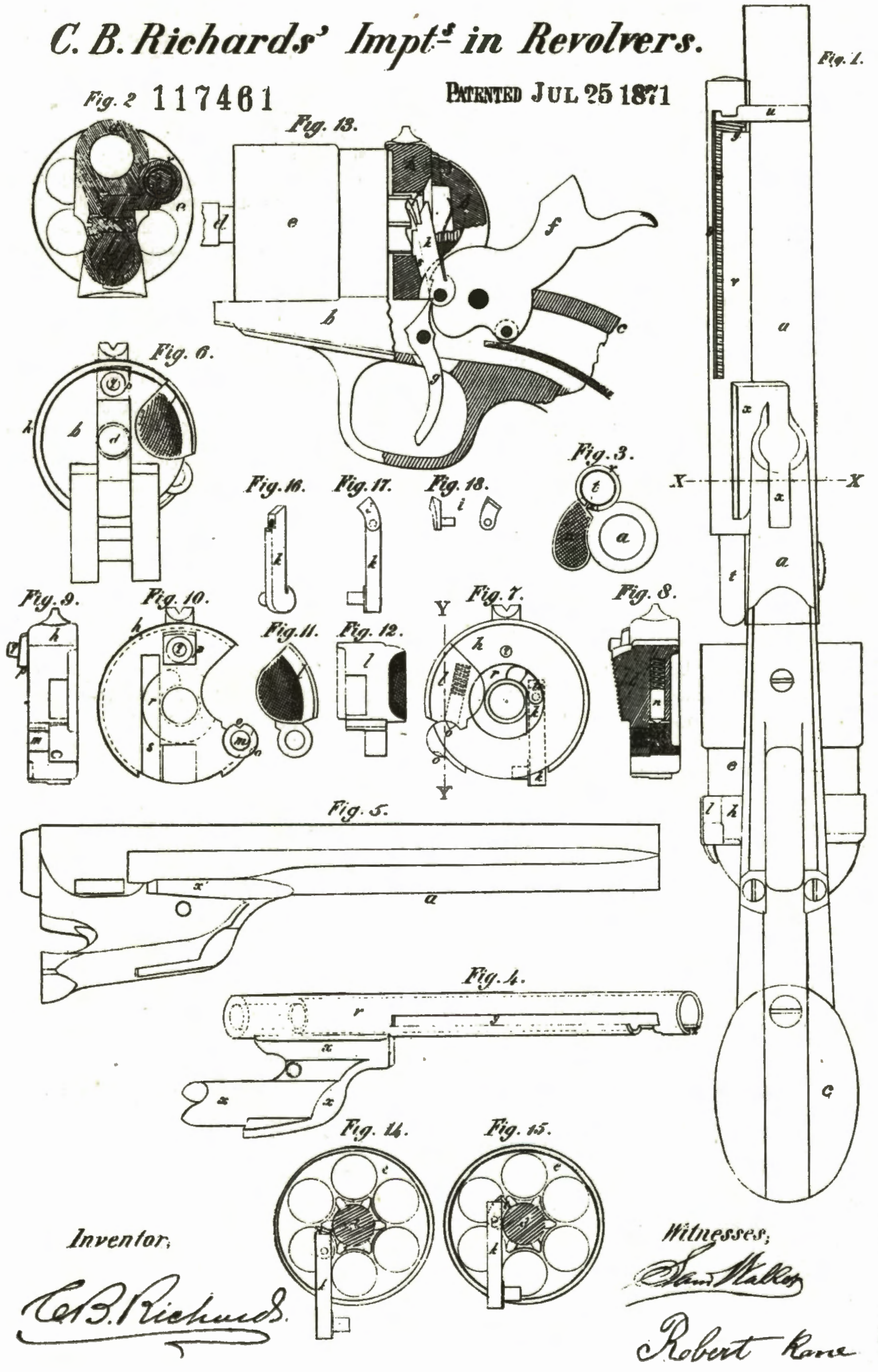


FIGURE 2–15. Drawing from Charles B. Richards' patent for converting the Colt percussion revolvers to cartridge-firing breech-loaders. He obtained patent protection for the cartridge ejector housing, which fit into the recesses previously used to house the rammer and lever; for the projection (*p*) on the breech ring (*fig. 9*), which kept it from turning; and for a modification to the cylinder rotating pawl. In all, this was not a very strong patent. (*U.S. Patent Office*)

factory. The new "form of the 'frame' gives greater strength, and also gives more space for the cylinder, which together with the improved 'base-pin' reduces the tendency to clog when fired." This report sounded the death knell for the open-top Model 1872.

Two further trials had to be carried out before the Colt Company could receive an order for their Single-Action Army revolver. First, Captain Edie had to examine the Smith & Wesson Model 1873, which had an altered ejection mechanism; and second, he had to test the first model of the Schofield Smith & Wesson, designed by Major George W. Schofield, an officer of the Tenth Cavalry. Schofield had taken out a patent (U.S. patent 116,225, 20 June 1871) on a barrel latch mounted on the frame rather than on the barrel that he designed to be closed by the hammer before firing. He also held a patent (U.S. patent 138,074, 22 April 1873) on an ejector with the spring housed inside its stem and on a rotating crank enclosed by the recoil plate. Edie found this revolver an improvement over the American Model, but "the number of parts was reduced by *one only* in the whole revolver, still leaving it objectionable for troops," compared to a weapon with fewer, simpler parts. On 26 June 1873 in *Ordnance Notes* (no. 5), Edie wrote: "As the reports . . . plainly show the superiority of the Colt revolver (last model) over all others tried, the Chief of Ordnance has been authorized by the War Department to purchase 8,000 of these arms for the cavalry arm of the service."[8]

The new guns were chambered for .45 caliber (11.43mm) center-fire cartridges with 15-gram bullets, and 1.8 grams of black powder, but they would also take Colt commercial cartridges of up to 2.6 grams. Correspondence in the Springfield Armory files indicates that while the order was being filled the specifications were changed to provide for six grooves instead of seven in the rifling, with one uniform turn in 406 millimeters, rather than a progressive twist over 945 millimeters. Sighting for 22.9 meters was also specified, as was a front steel sight. The chief of ordnance in his report for 1873 stated:

> The general and constant demand from the field for revolvers using metallic ammunition, together with the urgent necessity for some improved weapon to replace the revolvers previously used in service using the paper or linen cartridges, caused early efforts to be made to reach a solution of this very difficult problem. After trials in the field of two kinds, and experimental trials of improved models, this Bureau recommended for approval the purchase of a sufficient number of the Colts to supply the cavalry arm of the service. They are now being made, and it is hoped that the whole number will be in the hands of troops before the next spring.[9]

THE SCHOFIELD PISTOL Wesson, Smith, and Schofield, not overly discouraged that their weapon had not been adopted immediately, persisted in their attempts to have their revolver reexamined. Early in 1874, the new chief of ordnance, General Steven Vincent Benét, convened a board of officers—Major James G. Benton, Captain John R. Edie, and Lieutenant Henry Metcalf—to examine new handguns. Smith & Wesson submitted two revolvers, a modified Russian model and the Schofield model. After trials that lasted from March through April, on 22 April 1874, the board resolved: "That Major Schofield's alteration of Smith & Wesson's revolver, in consequence of its simplicity, efficiency, strength, lightness, and the ease with which it can be taken apart; and of the probability that its peculiar construction will diminish the cost of its manufacture below that of the Smith & Wesson pistol, is well suited for use in the military service."

Major Schofield had a completely new example of his design ready for the board's June 1874 review.* The new model embodied all the features of the Schofield alteration,

*Lieutenant George D. Ramsey, Jr., had meanwhile relieved Captain Edie.

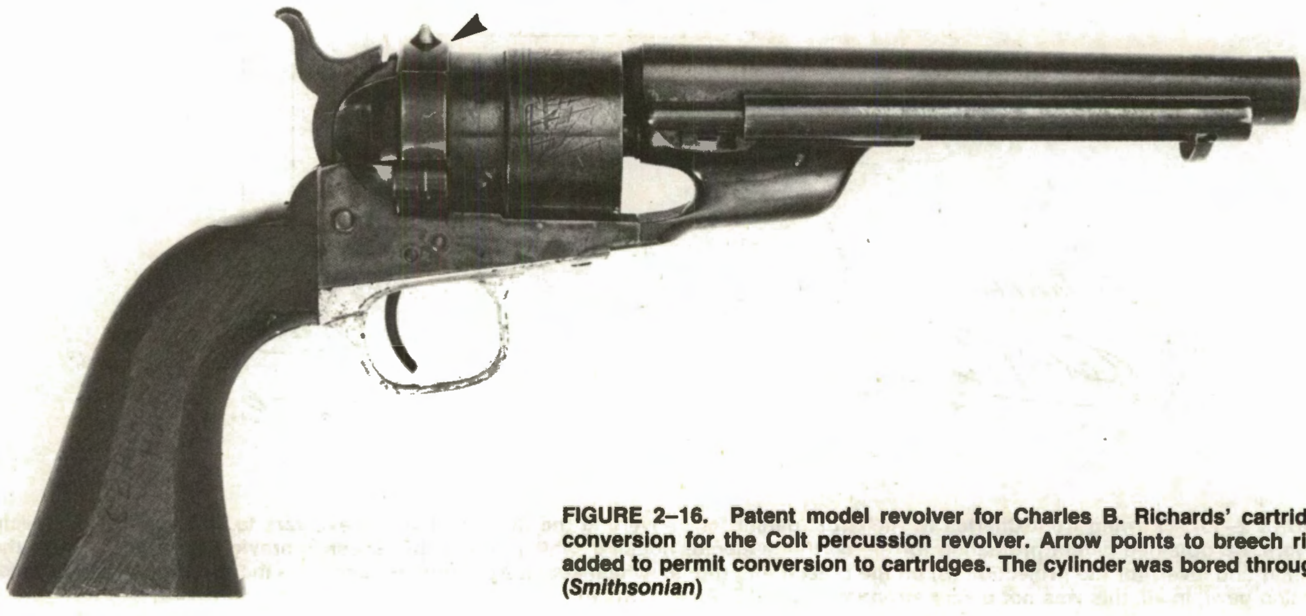


FIGURE 2–16. Patent model revolver for Charles B. Richards' cartridge conversion for the Colt percussion revolver. Arrow points to breech ring added to permit conversion to cartridges. The cylinder was bored through. (*Smithsonian*)

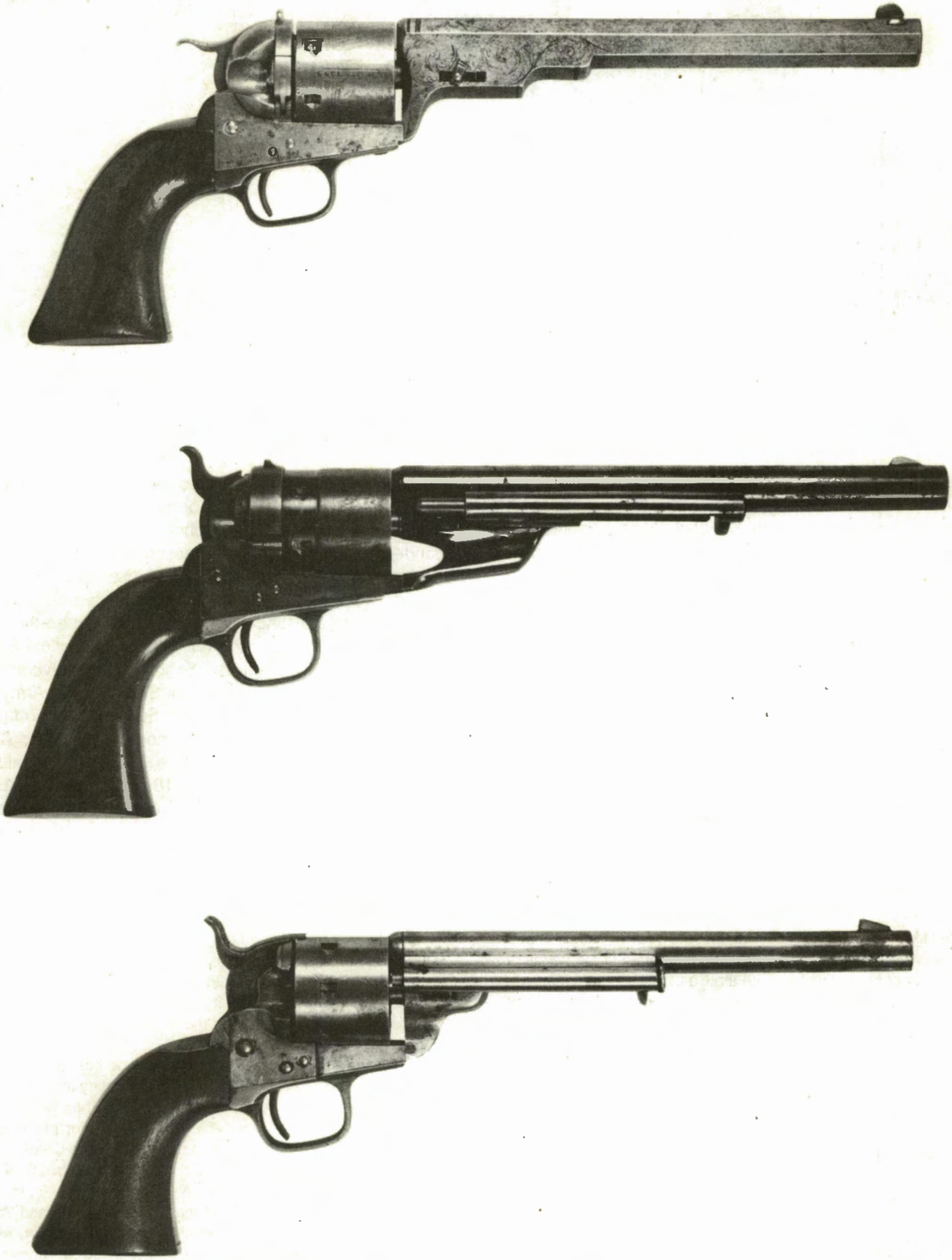


FIGURE 2–17. ***Top,*** **Colt Old Model Navy pistol converted to .38 caliber rim-fire.** ***Middle,*** **Colt. 44 center-fire Richards-Mason conversion of the Model 1860 Army revolver.** ***Bottom,*** **Colt .44 rim-fire Model 1872 (experimental). This open-top precursor was not a conversion but a newly-made revolver that used the 1860 Army revolver as its basic pattern. (*Colt*)**

FIGURE 2–18. Colt .44 caliber rim-fire cartridge Model 1872 revolver. (*Colt*)

plus the Schofield patent barrel latch and a return to the Smith & Wesson American Model style of grip. After a series of firing exercises, during which Schofield was permitted to make repairs and adjustments, an experiment with loading revolvers on horseback was conducted. At a hard gallop, an expert horseman was able to eject six empty shells and reload the Schofield with cartridges taken from his belt pouch in 26 seconds; the Colt required 60 seconds. This advantage was noted by the board among its other conclusions on 30 June 1874. The shape of the handle and the comb of the hammer are better, said the board. The parts of the handgun pertaining to the ejector, cylinder-bolt, and barrel latch are strong and simple, easily dismounted and replaced, and the barrel latch of the Schofield was thought to be safer than the Smith & Wesson. The weight of the Schofield pistol (1,155 grams) placed it between the Colt (1,070 grams) and the old model Smith & Wesson (1,205 grams).

> In consideration of the foregoing facts, . . . it was *Resolved,* That in the opinion of the Board, Major Schofield's revolver is well suited for the military service, and that the Board do recommend that a limited number of these pistols be placed in the hands of troops for comparative trial with the Colt's and Smith & Wesson revolvers now in service, and that, as far as possible, the different pistols can be tried side by side in the same commands.[10]

On 3 July 1874, the secretary of war approved an order for 3,000 Schofields chambered for .45 caliber (11.43mm) center-fire cartridges with 1.8 grams of black powder and a 15-gram bullet.

The Smith & Wesson Model 3 Schofield revolver was considerably different from their Model 3 American. In addition to being .45 caliber (11.43mm), the Schofield had several mechanical changes. There was the new barrel latch and a new extractor, a star-wheel assembly that lifted all six cases out of the cylinder simultaneously. It was cam-operated instead of rack-and-gear actuated. The cylinder could be removed for cleaning, and the top surface of the barrel had been grooved to improve sighting.

Schofield was still not satisfied with the weapon, however. During the summer, between operations in the field where he was assigned, Colonel Schofield continued his correspondence with the Smith & Wesson factory technical staff. The result was a slightly modified barrel latch, which was incorporated in the second lot of Schofields ordered by the army. Collectors distinguish between the two as the Model 3 Schofield First Model and the Model 3 Schofield Second Model. Despite his efforts, Schofield's revolvers never achieved the popularity of the Colt Single-Action Army.

Two factors argued against the Schofield and in favor of the Colt: (1) Colt's revolver was more rugged, and (2) the Schofield multiple extraction feature was not essential to the warfare of the American plains. In 1877, Captain Otho Ernest Michaelis, ordnance officer of the Department of the Dakota, evaluated the Schofield revolver based upon its usage in a number of engagements with hostile Indians.

> The experience of the past year, has shown that the Colt's calibre .45 pistol is a reliable weapon. The Schofield Smith and Wesson Revolvers used in the field, have not proved themselves acceptable to Cavalry officers.
>
> Of course their only claim to superiority over the Colt's is founded upon their capability of automatic extraction. This feature, however, is attained at the expense of simplicity of mechanism and strength.
>
> . . . That Cavalry officers themselves do not pay much attention to the quality of rapid ejection is proven by the fact that they do not desire to carry on the person, more than twelve rounds of ammunition. In the pistol charge of the battalion of the Seventh Cavalry upon the Nez Perces position on Snake Creek [30 September 1877 in northern Montana], Captain [Edward S.] Godfrey informs me that his men fired only a single round. . . . Instances have been reported to me of the Schofield Smith and Wesson barrel-catch's being drawn back while in the holster, and the cartridges being, in consequence, ejected in drawing the weapon.[11]

All of the Smith & Wesson Schofield revolvers had been removed from the Regular Army's arsenals by 1880, although

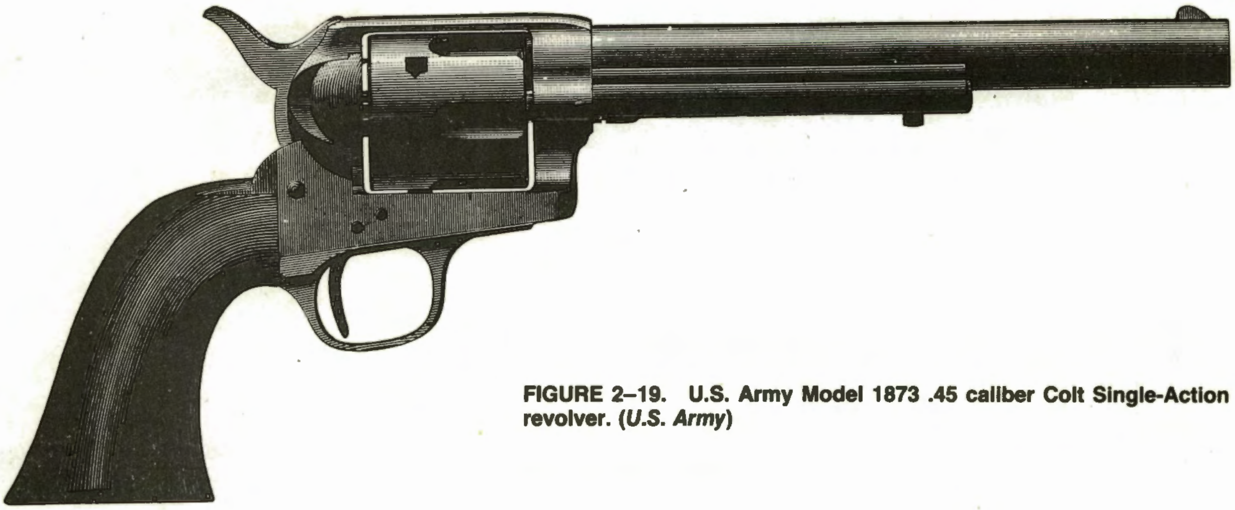


FIGURE 2–19. U.S. Army Model 1873 .45 caliber Colt Single-Action Army revolver. (*U.S. Army*)

FIGURE 2–20. Standard-issue Model 1873 Colt Single-Action Army, serial number 9,108, manufactured in 1874. (*Tokoi*)

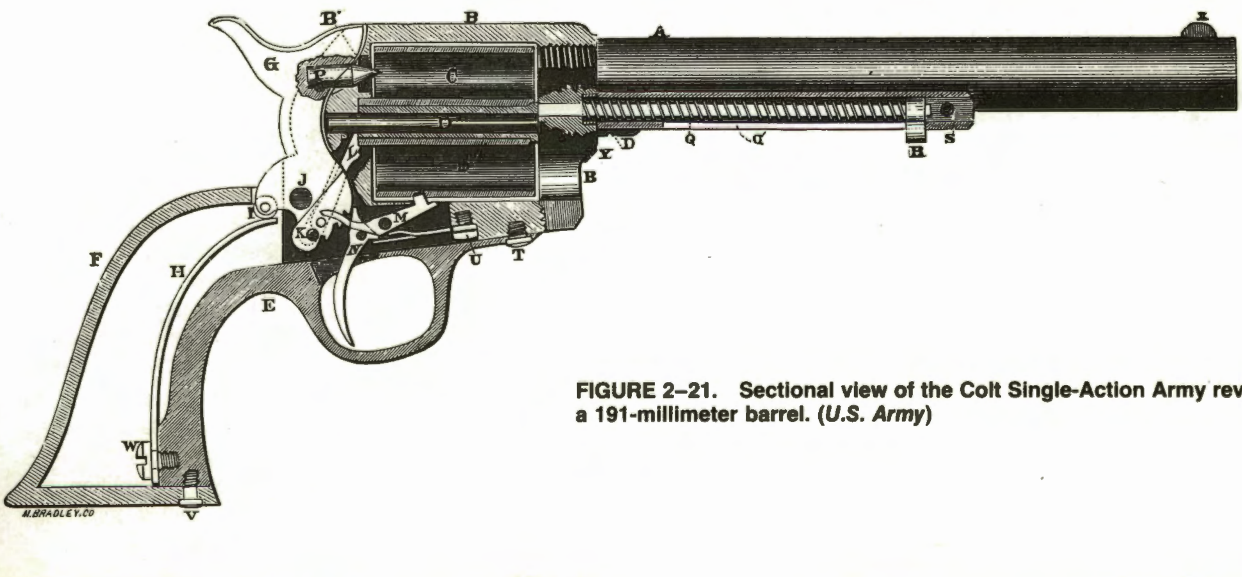


FIGURE 2–21. Sectional view of the Colt Single-Action Army revolver with a 191-millimeter barrel. (*U.S. Army*)

FIGURE 2–22. A combat survivor Model 1875 Schofield Smith & Wesson revolver. (*Smithsonian*)

FIGURE 2–23. U.S. Army Model 1874 .45 caliber Smith & Wesson Schofield revolver. (*U.S. Army*)

some may have remained in the hands of the militia. Schofield ended his life with one of his own revolvers on 17 December 1882. The *New York Herald* carried an obituary.

> Lieutenant Colonel George W. Schofield, Sixth Cavalry, and brother of Major General Schofield, commanding the Division of the Pacific, committed suicide at Fort Apache, A. T., at daybreak on Sunday morning in his room. His servant was in the room building a fire, and Lieutenant Colonel Schofield was at the washstand combing his hair. He asked his servant to leave the room, and he had barely closed the door when the shot was fired. He had been crazed for eight or ten days over some invention of his, and it is supposed that in a moment of temporary insanity he shot himself.[12]

SINGLE-ACTION REVOLVERS The designers at the Colt Company in Connecticut tended not to be flamboyant; they were technicians of the machine age, not entrepreneurs like Sam Colt or Robert Adams. They were problem-solving men, who looked for ways to simplify the production of their firearms. It made little difference what company they worked for, as long as the firm provided the management and sales staff to support their work—the design and production of durable, commercially successful guns. William Mason, a key individual in pulling together the design elements of the Model 1873 Colt Single-Action Army, was such a technical problem solver.

Born in Massachusetts in 1837, Mason operated the Mason Machine Works, in Tauton, Massachusetts during the American Civil War. By the end of the conflict his firm had produced in excess of 30,000 Model 1861 Springfield-type muskets for the U.S. Army. After the war, he had a business relationship with the Remington Arms Company, to which he assigned two of his revolver patents. During his career, Mason received 125 patents covering a wide range of mechanical designs from attachments for textile machinery to bridges. Most important were his ideas for firearms, ammunition, and machinery. Joseph Wickham Roe in his book *English and*

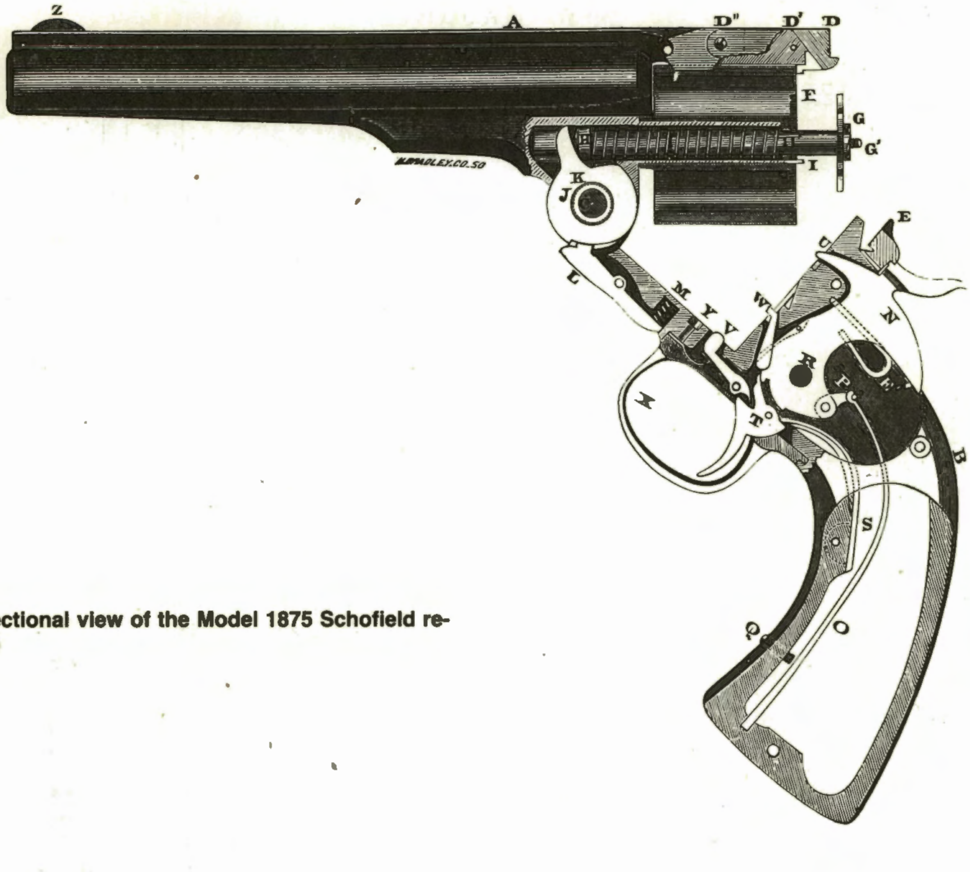


FIGURE 2–24. Sectional view of the Model 1875 Schofield revolver. (*U.S. Army*)

American Tool Builders described Mason as a "modest, kindly man, little known outside his immediate associates, but a singular fertility in invention and almost unerring in mechanical judgment."[13]

In about 1869, Mason moved to Hartford and started to work for the Colt Company, which was still trying to establish its place in the postwar firearms market. Sam Colt had died on 10 January 1862, and Elisha Root, who had replaced him as the company's leader, had died shortly after the war. The deaths of Colt and Root deprived the company of its primary source of handgun design and its management talent. Richard W. H. Jarvis, Colt's brother-in-law was destined to be the company's president for the next 46 years even though he knew very little about the firearms business. The man he selected to act as vice president and general manager of production, General William Buel Franklin, was also new to the business. From 1865 to 1870, the Colt Patent Firearms Manufacturing Company drifted without a real technical innovator, so Mason's arrival was especially important.

Mason's work at Colt with Charles B. Richards on the solid-frame Colt Single-Action Frontier has never been adequately documented, but it appears that the two men each contributed new ideas—Richards the loading gate (covered in his patent 117,461, 25 July 1871), and Mason the ejector rod (patent 128,644, 2 July 1872). However, the Colt Single-Action was not built upon patents, but upon solid engineering. It could have been copied—and it was outside the United

TABLE 2-2 COLT AND SMITH & WESSON PROCUREMENT AND ISSUE BY REGULAR U.S. ARMY FORCES

	Colt Model 18		*Smith & Wesson Model 1875 Schofield*	
Year	*Delivered*	*Issued*	*Delivered*	*Issued*
1874	**8,000**	**6,801**		
1875	**6,400**	**2,750**		
1876	**670**	**949**	**3,000**	**859**
1877	**2,003**	**2,777**	**5,003**	**2,695**
1878		**658**	**2**	**182**
1879	**3,000**	**873**	**280**	**169**
1880	**2,000**	**1,185**		**331**
1881	**1,000**	**938**		**210**
1882	**1,000**	**840**		**35**
1883	**1,000**	**1,359**		**226**
1884	**2,002**	**765**		**24**
1885	**2,000**	**592**		
1886	**2,000**	**735**		**24**
1887	**2,000**	**776**		**38**
1888		**1,132**		
1889		**1,394**		**146**
1890	**1,000**	**2,575**		**28**
1891	**3,000**	**968**		**31**
1892		**1,023**		**17**
1893		**651**		**3**
Totals	**37,075**	**29,741**	**8,285**	**5,019**

Source: John E. Parsons, *The Peacemaker and Its Rivals* (New York: William Morrow, 1950), pp. 23, 33. Slightly different figures are presented in Ron Graham et al, *A Study of the Colt Single Action Army Revolver* (Dallas: Taylor Pub., 1972), p. 455.

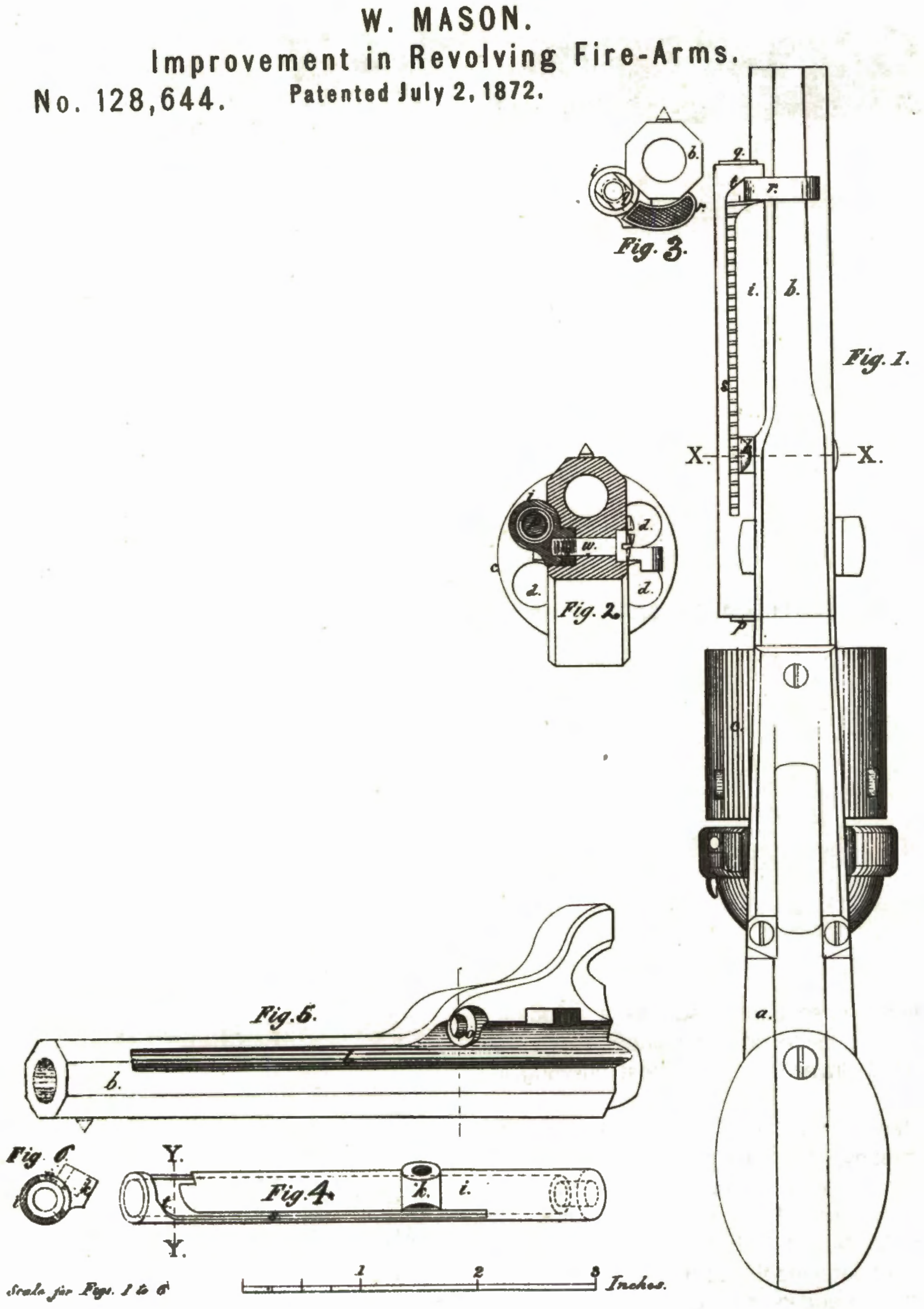


FIGURE 2–25. William Mason's patent for a revolver ejector rod. (*U.S. Patent Office*)

States—without fear of patent infringement, but it was not, although Remington came close with their 1875 revolver. Colt maintained its position as the U.S. Army's pistol supplier through quality and low-cost production.

The Colt Single-Action Army was a successful product. Over a 20-year period, the army purchased 37,075, but that is literally only a tenth of the story. Between 1873 and 1941, Colt produced nearly 360,000 of these revolvers. The coming of World War II caused a temporary end to Single-Action Army manufacture, but due to popular demand production was revived in 1956.

DOUBLE-ACTION REVOLVERS By the mid-1870s, single-action pistols were giving way to double-action weapons in Europe, and it was inevitable that the change would also take place in America. William Mason, then residing in a brick house owned by Colt on Huyshope Avenue just down and across the street from the factory, developed the first Colt double-action revolver in 1876. Mason received three patents on this design although none was of major significance by itself (247,217, 20 September 1881; 247,938, 4 October 1881; 248,190, 11 October 1881). Captain Michaelis of the Dakota Department received one of the early *Lightning* re-

TABLE 2-3 CHARACTERISTICS OF THE COLT SINGLE-ACTION ARMY AND ITS MAJOR AMERICAN RIVALS

Dimensions	*Colt M1873*	*Schofield M1875*	*Remington (1875)*	*Forehand & Wadsworth*	*Merwin Hulber*
Total length (mm)	**318**	**318**	**331**	**334**	**318**
Length of barrel (mm)	**191**	**179**	**189**	**191**	**179**
Diameter of bore (mm)	**11.43**	**11.05**	**11.18**	**11.05**	**10.67**
Grooves, depth (mm)	**.127**	**.191**	**.101**	**.191**	**.127**
Grooves, number of	**6**	**5**	**5**	**6**	**6**
Twist	**Left**	**Right**	**Left**	**NA**	**NA**
Uniform, one turn in (mm)	**406**	**508**		**732**	**544**
At base, one turn in (mm)			**127**		
At muzzle, one turn in (mm)			**660**		
Weights (g)					
Total	**1,048**	**1,134**	**1,179**	**1,048**	**1,226**
Powder charge	**1.81**	**1.81**	**1.83**	**NA**	**1.49**
Bullet	**14.9**	**14.9**	**14.68**	**NA**	**16.33**

TABLE 2-4 AMMUNITION PERFORMANCE

Ammunition	*Initial Velocity (m/sec)*	*Penetration (mm)*
Schofield, service ammunition	**227**	**1,168**
Colt, service ammunition	**223**	**1,194**
Colt, Bridgeport ammunition*	**271**	**1,473**
Remington, Remington ammunition	**200**	**1,092**

*2.44-gram powder; 16.17-gram lead.

volvers in 1877. Although the new weapon was only available in .38 caliber (9.7mm), Michaelis could see the virtue of its rapid fire. He predicted that the double-action revolver would become "the future pistol of the Army."

General Franklin, Colt's general manager, in the hope that the double-action would be adopted, presented a .45 caliber (11.43mm) Colt double-action pistol to Michaelis in June 1878. The officer wrote: "All who have seen it pronounce it the best revolver yet made. It is well-balanced and well-proportioned. I have asked for 100 to be issued to Cav'y companies for trials. The Colts has been made the weapon of the 7th Cav'y by a regimental order." Colonel James G. Benton, commandant of Springfield Armory, noting Michaelis' request for the double-action revolvers, wrote to Franklin at Colt on 5 August 1878 asking for the loan of one of the new double-actions for testing purposes and also inquiring of the general manager his opinion of the new gun's suitability for military action. Benton himself was not very impressed with the revolver, and in forwarding Franklin's reply to the chief of ordnance, he noted:

The only advantage that this system possesses is, that the arm can be fired rapidly without disturbing the aim. The disadvantages are, liability to accidental discharge, and failure to explode the cartridge. The reason for the first will be apparent to any one who examines the arm. While experimenting with one of the two pistols sent to this Armory by Genl Franklin one of them was fired prematurely, although the person handling it was careful and experienced. He is unable to state the precise cause of the accident.

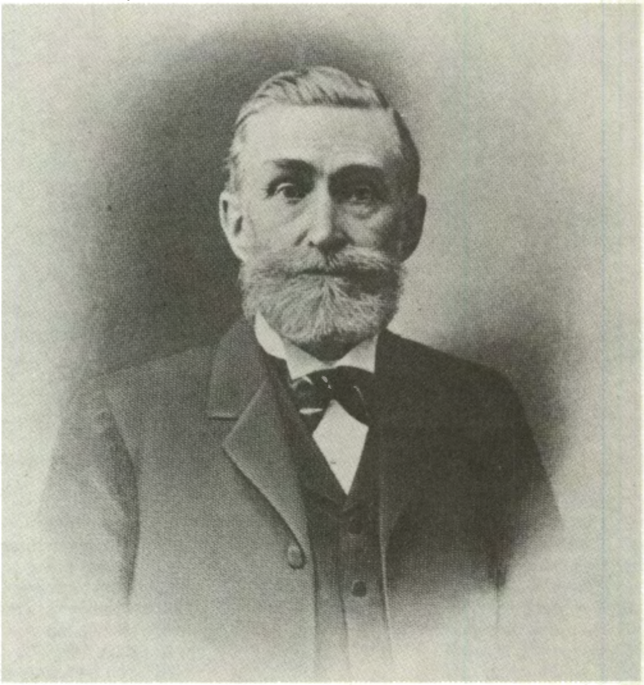


FIGURE 2–26. William Mason (c. 1837–1913). (*Winchester*)

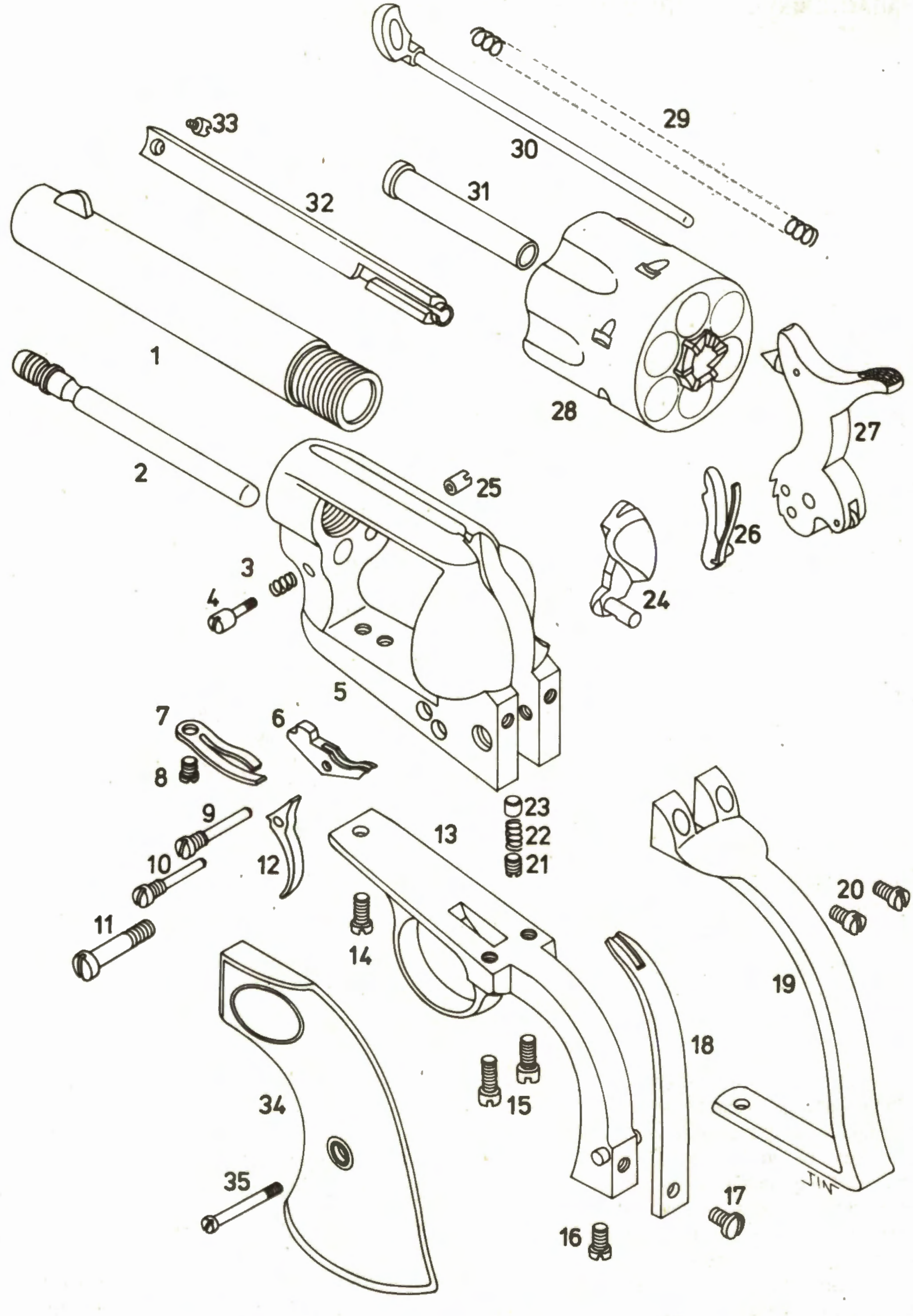


FIGURE 2–27. Exploded view of the Colt Single-Action Army. (*Jimbo*)

1 Barrel
2 Cylinder pin
3 Cylinder pin release spring
4 Cylinder pin release
5 Frame
6 Cylinder bolt
7 Sear and bolt spring
8 Bolt spring screw
9 Cylinder bolt screw
10 Trigger screw
11 Hammer screw
12 Trigger
13 Trigger guard
14 Trigger guard screw
15 Trigger guard screws
16 Front backstrap screw
17 Mainspring screw
18 Mainspring
19 Backstrap
20 Top backstrap screws
21 Gate catch screw
22 Gate catch spring
23 Gate catch
24 Loading gate
25 Cylinder pin release nut
26 Hand with spring
27 Hammer
28 Cylinder
29 Ejector rod spring
30 Ejector rod
31 Cylinder pin bushing
32 Ejector rod housing
33 Ejector rod housing screw

(No Model.)

W. MASON.

REVOLVING FIRE ARM.

No. 247,374. Patented Sept. 20, 1881.

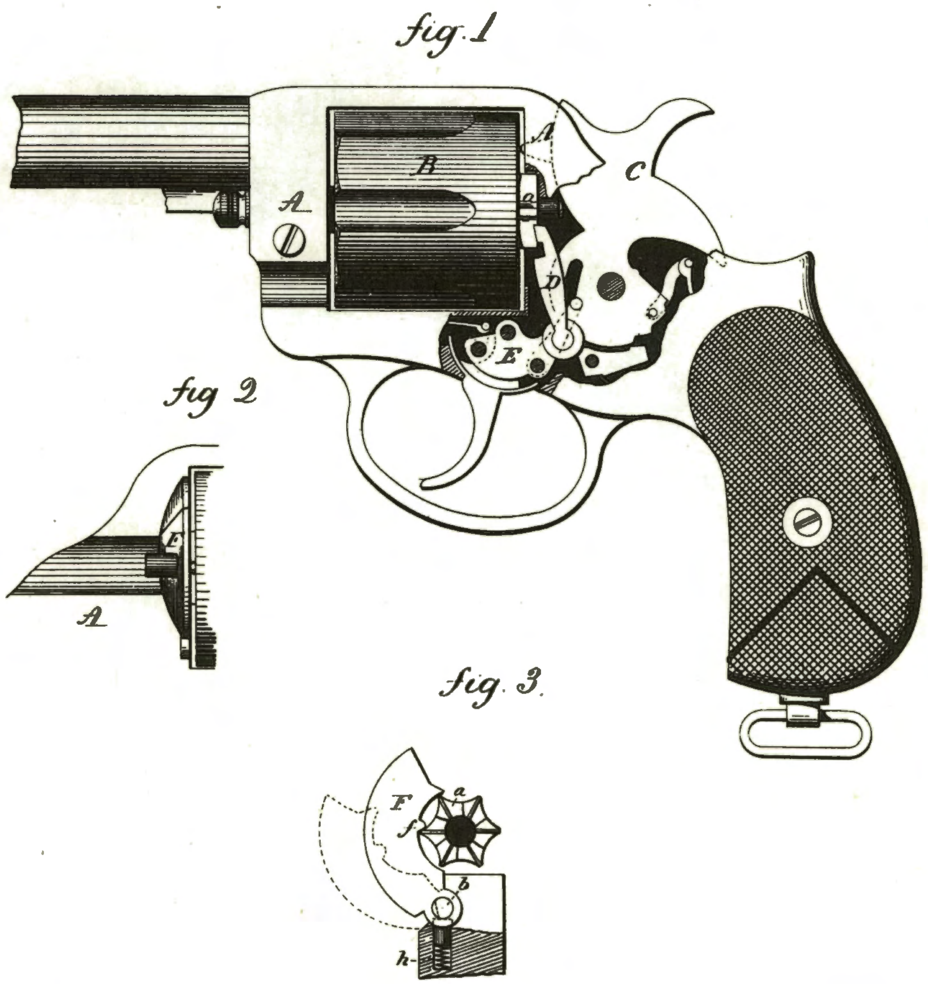


FIGURE 2–28. William Mason's patent for the Colt 1878 Double-Action Army revolver. This drawing illustrates the lock mechanism. *(U.S. Patent Office)*

> Out of 100 trials of one of these arms there were seven misfires. The liability to misfire arises from the necessity of making the mainspring so weak that its pressure may be overcome by the finger pulling on the trigger.[14]

This unfavorable report terminated Ordnance Department interest in the new double-action .45 (11.43mm) revolver. Although another specimen was sent to Springfield in October 1879, the government did not purchase any. However, the weapon was popular with army officers who bought it privately.

While the army continued experiments on various revolvers and attachments such as safeties, Colt, Smith & Wesson, and other companies searched for better double-action revolvers. At Colt, Mason and Carl J. Ehbets began to work on a design for a solid-frame revolver with the cylinder mounted on a hinged assembly called a crane that could be swung to one side to permit the ejection of fired cartridges and the loading of new ones. Mason received several patents for possible solutions to this problem (249,649, 15 November 1881; 250,375, 6 December 1881; 263,551, 29 August 1882), all of which he assigned to Colt. Ehbets received a patent for converting the Colt Single-Action Army to a swing-out cylinder (303,135, 5 August 1884). Horace Lord and Ehbets received patents for a top-swinging cylinder (303,172, 5 August 1884; 303,827, 19 August 1884). But the key patent was Ehbet's 1888 design for a revolver mechanism upon which all subsequent Colt double-action, swing-out revolvers evolved.

When William Mason left Colt in 1882 to work for the Winchester Repeating Arms Company, Carl Ehbets became the key individual in the design and production of Colt hand-

FIGURE 2–29. The Colt 1878 .45 caliber double-action revolver designed by William Mason. (*Colt*)

guns. Born in Germany in 1845, Ehbets had worked for the Krupp firm for a few years before emigrating to the United States. After arriving in America in 1866, Ehbets first worked for Pratt & Whitney and then for Colt. One of his first tasks at Colt Company involved the refinement of the Gatling Gun to make it easier to manufacture. He was probably only a junior technician at this time since in the 1880 census he gave his occupation as "draughtsman." Ehbets was only 43 when he patented his swing-out cylinder revolver in 1888. In later years, he became the Colt Company's senior technical employee, and from the mid-1890s to mid-1920s he also acted as the firm's patent specialist.

Ehbets' double-action, swing-out cylinder was developed around Colt's .38 caliber (9.7mm)* and .41 caliber (10.4mm) center-fire cartridges. The six-cartridge cylinder was mounted on a crane that was pivoted on the front of the frame. By drawing back a sliding latch (mounted on the left side of the frame adjacent to the hammer), the cylinder was unlocked and could be swung outward to the left. The chambers could be loaded individually or all of them could be ejected simultaneously by pressing rearward an extension of the pin on which the cylinder revolved. This pin was connected to the star-type ejector, which rested below the rims of the cartridge cases. After loading or unloading the cylinder, it could be swung closed and latched in place by an internal latch pin (connected to the external latch), which engaged a depression in the center of the cylinder rotating ratchet on the cylinder. The frame, trigger guard, and butt of Ehbets' revolver were machined from a single forging. A large side plate was provided to permit assembly and disassembly of the lock mechanism.

The U.S. Navy Ordnance Bureau began searching for a new handgun in 1887 because the revolvers they had on hand at this time were obsolete, described as having "come down from the war." Many of these were converted 1851 Navy revolvers, which had been sent to the Colt factory for alteration to .38 caliber (9.7mm) center-fire in 1873. The navy decided in favor of the new .38 caliber (9.7mm) Colt revolver, standardizing it as the Model 1889. An initial order for 5,000 was placed with Colt in 1888. These first new navy revolvers did not have cylinder locking notches. Locking was accomplished by a double projection of the pawl, which rotated the cylinder. Most of the Navy's 5,000 Model 1889 revolvers were later reworked to the New Army Model 1892 cylinder locking system. The 1892 Navy Model had a shorter barrel—102 millimeters rather than 152 millimeters. Following the navy's adoption of this handgun, the army conducted a trial at Springfield Armory of the Colt and a .38 caliber (9.7mm) five-shot double-action-safety hammerless Smith & Wesson revolver. The Smith & Wesson was tested as the result of a

*Although popularly referred to as a 9mm cartridge, the Colt bullet had a nominal diameter of .38125 inch or 9.68375 mm, which is rounded to 9.7mm in this book.

request from Captain W. P. Hall of the Fifth Cavalry, who had seen the gun and was impressed by it.

Captain J. C. Clifford and First Lieutenant J. W. Benét conducted the trials according to the procedures standardized for revolver tests in 1876. The following remarks are excerpted from their report dated 15 April 1889:[15]

> . . . The multiplicity of parts and their nicety of fit make it [Smith & Wesson revolver] almost impossible for any one, not a skilled and instructed mechanic, to dismount and assemble the arm and replace broken parts, without marring or impairing the arm.
>
> On the other hand locating the hammer and lock mechanism entirely within the frame, renders the arm less liable to accidental injuries and prevents the parts from clogging from dust and rust. The cylinder is easily removed and replaced, and the parts where fouling accumulates are easily accessible. The revolver stood all the tests very well, up to the last rust test; and with the most ordinary care a revolver could be prevented from becoming rusted to such an extent. In this test, however, the arm was totally disabled. Two mainsprings were broken in this test which would seem to imply that their temper was too high. . . .
>
> Captain Hall makes the following special claims for the arm:
>
> (1) A revolver cocked with the forefinger has a great advantage over one cocked with the thumb. In cocking a revolver with the thumb its position in the hand is rendered very insecure at the instant the thumb is changed from the hammer to the stock, and this insecurity is so increased in cold weather as to render a premature discharge probable and greatly diminish the rapidity and accuracy of fire.
>
> . . . This claim will apply equally well to the Colt, as it is a double-action revolver.

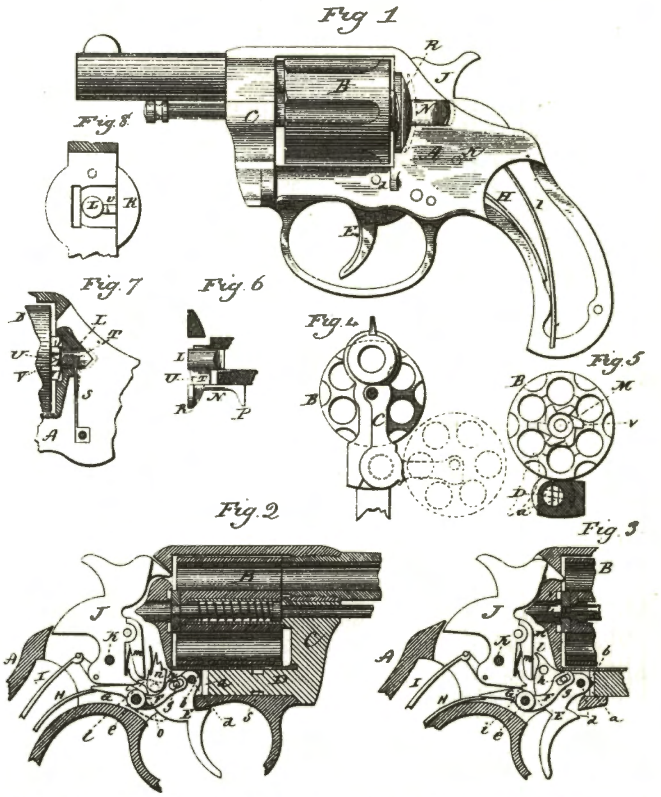


FIGURE 2–30. Carl Ehbets' patent for the Colt side-swing, double-action revolver as utilized in Models 1888, 1892, 1894, 1896, and 1901. Production models did not have a rounded butt. (*U.S. Patent Office*)

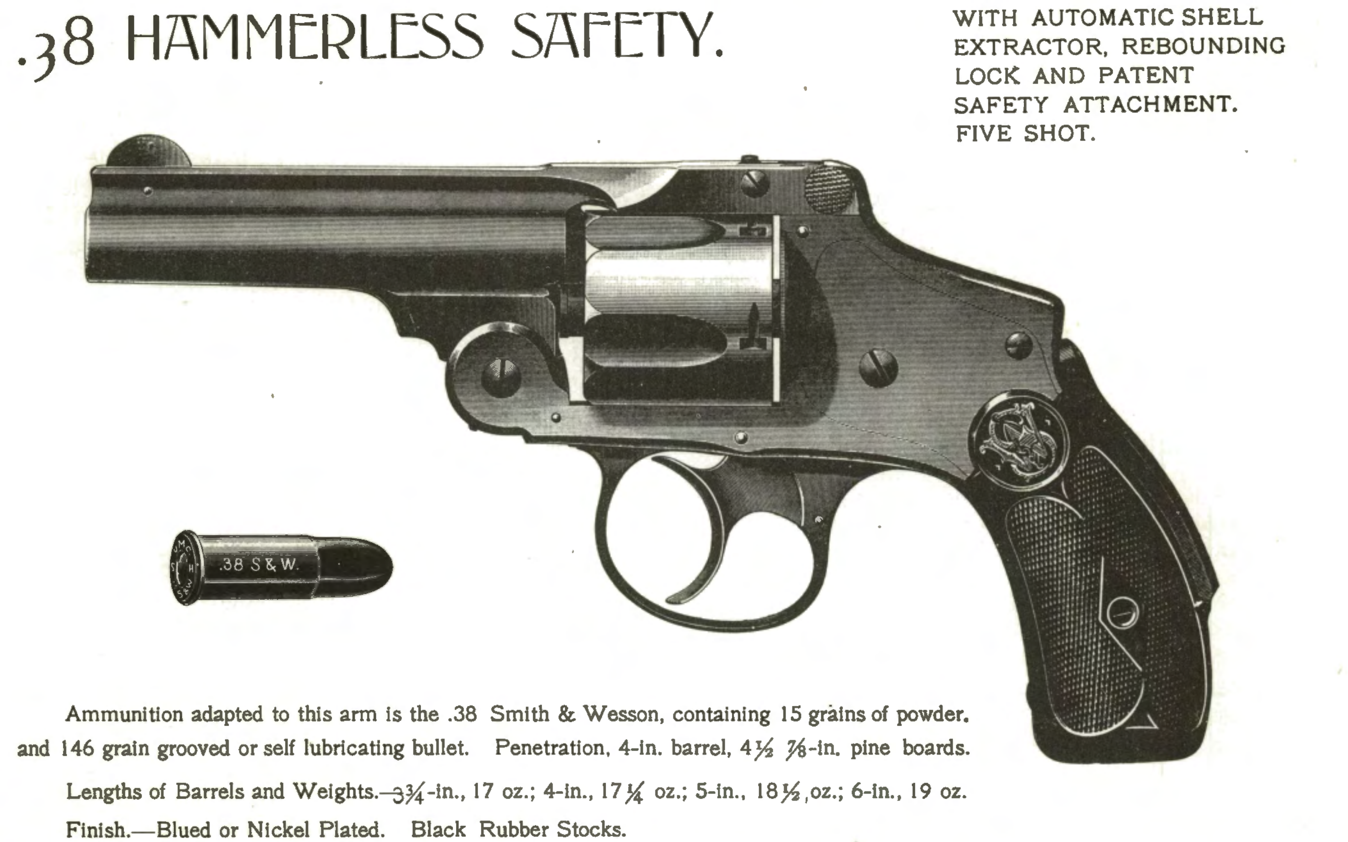


FIGURE 2–31. The Smith & Wesson .38 caliber hammerless safety revolver as tested in 1889 by the U.S. Army, weighing 524 grams with a 127-millimeter barrel. (*Smith & Wesson*)

> (2) The Smith & Wesson revolver under discussion has an advantage over all other revolvers cocked with the forefinger, in the fact that there is an indication in the pull which informs the shooter when the cartridge is to be stuck. This new and novel device renders this revolver equal, if not superior to all others even as a target pistol. . . .
>
> (3) The revolver has also a safety device in the stock which prevents it from being fired unless the handle is grasped.
>
> The Board recognizes the advantage of the safety device but thinks that by its use accidents will only be partially avoided. A great number of premature discharges take place when the handle of the revolver is grasped by the soldier.
>
> The workmanship of the revolver leaves nothing to be desired and the accuracy of shooting is most satisfactory. Whether it will stand the rough usage of the service is another question. . . . The cartridges used worked well in every respect and have the great advantage of having the lubricant covered by the cartridge shell instead of being placed on the exposed portion of the bullet.

Turning to the Colt revolver, the two army examiners had the following to say about it:

> This revolver [Colt] has the great advantage of possessing a solid frame and this is combined with the feature of simultaneous ejection of cartridges, though the ejection is not automatic as in the Smith & Wesson. The principal defect developed in this arm was the weakness of the rebound spring which in many cases would not turn the trigger forward after the discharge of the revolver. The substitution of a stronger spring or the addition of a strain screw would remedy this defect. Several failures of the hand to revolve the cylinder were noted, and on dismounting the revolver a large amount of dirt and fouling was found in one case between the hand and hand spring.
>
> This revolver does not possess the safety device of the Smith & Wesson and is, thereby, most liable to accidental discharges when the handle is not grasped in the hand. It lacks the hammerless feature of the Smith & Wesson, but in spite of the hammer not being located entirely with the frame, it showed a decided superiority in the rust test. Moreover having a hammer it can be used as a single action revolver. . . . There are no very delicate parts, and suitable provisions are made against accidents. . . . In accuracy the revolver showed itself inferior to the Smith & Wesson. . . .
>
> The ammunition used the Board considers to be greatly inferior to that used in the Smith & Wesson revolver. The outside lubrication used on the bullets was productive of much fouling, and there was great difficulty at times in forcing the cartridges into the chambers.

It was decided that a limited quantity of the Colt and the Smith & Wesson should be distributed among the troops.

> Each of the revolvers possesses advantages peculiar to itself, and a competitive test in service would be necessary to determine which is the superior.

Tests with these two double-action revolvers came at a time when complaints about the Colt Single-Action Army were mounting. Most officers wanted a double-action handgun with multiple cartridge ejection. In *Cavalry Journal,* Captain William Preble Hall of the Fifth Cavalry wrote: "The difficulty in cocking the revolver is added to considerably when the horse is in rapid motion. Our Colt's revolver is as much inferior to some of the double action ones, as the old muzzle to the modern breech loader. . . . The calibre .45 Smith & Wesson is, if anything, a more indifferent weapon than the Colt's."[16]

Lieutenant H. L. Ripley of the Third Cavalry wrote to Colt in March 1890, to complain about difficulty in cocking the Army Colt when riding at a full gallop. If done as "recommended by the tactics . . . it revolves too far or not far enough, usually the former, so that when pulled the hammer does not strike on the centre of the cartridge." Ripley said he had tried several Colt pistols with the same result and believed that the defect in indexing was inherent in the single-action. He felt this would be eliminated in a self-cocking pistol.[17]

In 1890, Daniel W. Flagler (1835–1899), chief of ordnance, issued one hundred each of the Colt 1889 Navy and the Smith & Wesson hammerless safety revolvers to troops assigned to the First, Third, Sixth, Eighth, and Ninth Cavalries. Reports received from the troop commanders, with two exceptions, favored the new Colt, calling it a decided improvement over the .45 caliber (11.43mm) Colt. Another trial was conducted at Springfield Armory by Captain S. E. Blount and Lieutenant F. P. Peck. They tested modified pistols, altered to overcome defects discovered during the field trials. Their report revealed that of thirteen cavalry officers to whom the revolvers had been submitted, eleven preferred the .38 caliber (9.7mm), one liked the Smith & Wesson better, and one thought the .45 Colt was the best weapon because of its heavier bullet and greater stopping power. After concurring in the general preference for the .38 caliber (9.7mm) Colt, Blount and Peck reported that the army should choose the new Colt because it was lightweight, a good size, accurate, could be loaded and ejected rapidly, and above all was adaptable for use as either a single- or double-action revolver. It had one disadvantage, however, when compared to the .45 caliber (11.43mm) model—its diminished stopping power. "That the stopping power is less is of course evident, but that is no material disadvantage if it still remains sufficient. The question can only be definitely settled by actual trial against living objects, and until the revolver is tested in action the opinions of the cavalry officers who have used the weapons afford the best available evidence." It was suggested that the new Colt be modified by stengthening the rebound spring of the trigger and the locking device of the cylinder. On 19 April 1892, Chief of Ordnance Flagler recommended adoption of the Colt double-action to the secretary of war, whose approval was given on the twenty-fifth of the month.

That year Colt received an initial order for 5,000 Model 1892 New Army double-action revolvers, which were distributed to troops in 1893. Like the Navy Model 1889, the New Army had a counterclockwise cylinder rotation. By 1 November 1893, all cavalry units, with the exception of the Indian scouts, had the New Army revolver. Unfortunately, shortly after the new handgun was issued, a serious problem was discovered. The New Army's hammer could be dropped when the cylinder was not fully swung home into the frame. This problem was aggravated by the counterclockwise rotation, since this tended to unseat an improperly seated cylinder. Colt and army officials introduced a slight modification that prevented the hammer from falling if the cylinder was not fully latched, eliminating possible damage to the weapon and danger to the soldier.

The improvement was simple. A vertical groove was milled into the left-hand side of the pistol frame and a safety lever, pivoted at the top, which was acted upon by the internal latch pin of the external sliding cylinder latch, was secured within.

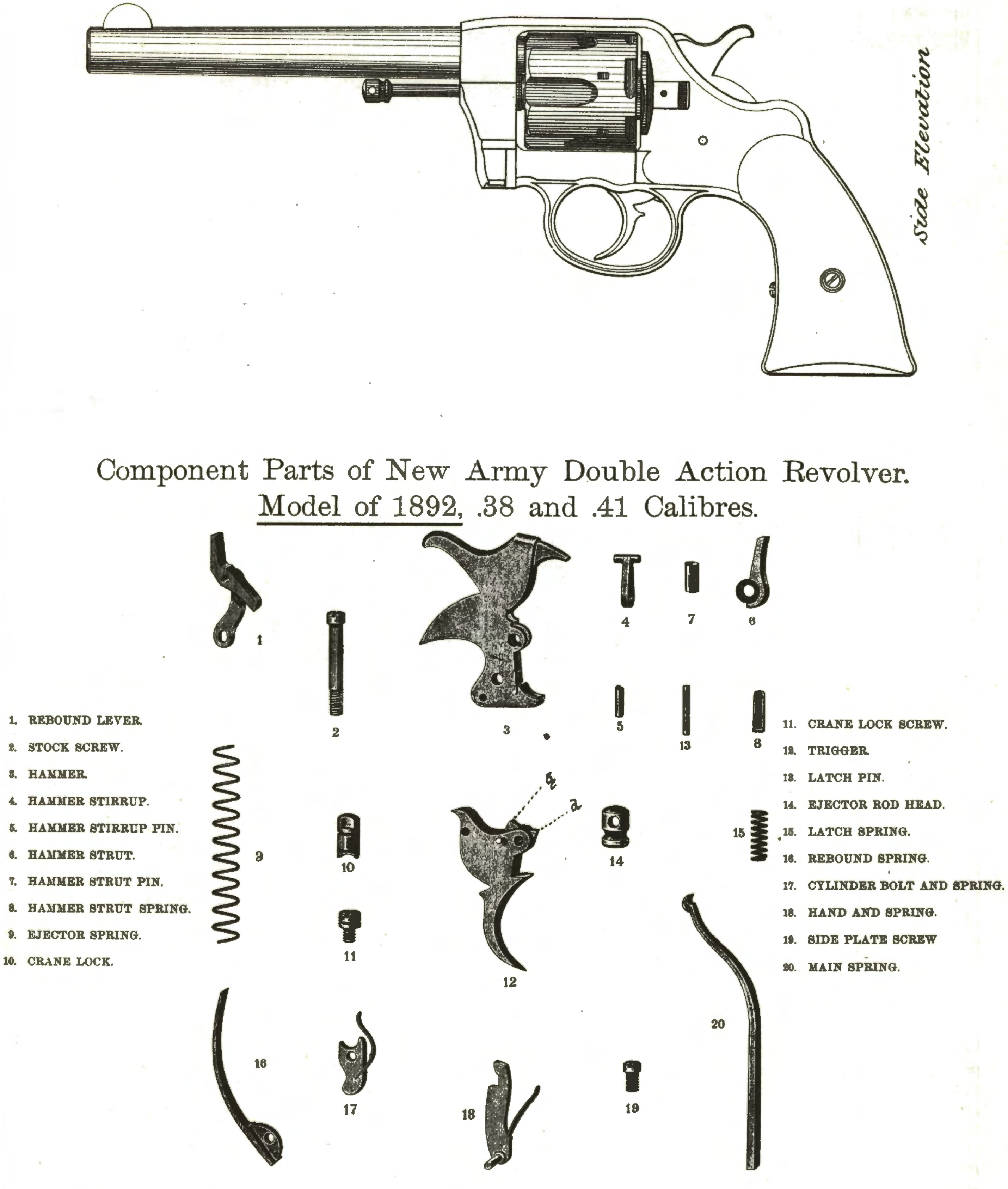


FIGURE 2–32. New Army Model 1892 double-action revolver. (*U.S. Army, Chief of Ordnance*, Annual Report for 1893)

FIGURE 2–33. Model 1892 Colt New Army Revolver, as displayed at the Columbian Exhibition in 1893 (*Smithsonian*)

When the cylinder was properly home in the frame, the latch pin held the safety lever clear of the lock mechanism and permitted firing. If the cylinder was not fully seated, the latch pin position caused the safety lever to tilt thus bolting the trigger, so the weapon could not be thumb-cocked or discharged by pulling the trigger. F. B. Felton obtained a patent (535,097, 5 March 1895) for this modification, which he assigned to Colt.

U.S. Army units began to receive the modified 1894 New Army revolver in late April 1895. The Ordnance Department had ordered 3,000 Model 1894s in August 1894, with an order for another 5,000 being awarded to Colt in April 1895. Model 1894 revolvers were exchanged for the Model 1892s in service.[18]

Conversion of the Model 1892 Colt New Army to the Model 1894 caused some friction between Ordnance Department officials and the people at Colt, however. Early in 1896, John H. Hall, who had succeeded General Franklin as Colt's vice president, noted to Colonel Alfred Mordecai, the commanding officer at Springfield Armory, that it would cost $3.50 per

revolver to convert the New Army to the Model 1894. This included a new hand and spring, a new trigger and pin, and a new locking lever and locking lever screw. Mordecai believed this price to be excessive, since a new Model 1894 revolver only cost $12.00, and suggested to Chief of Ordnance Flagler that the Armory undertake the conversion program. Mordecai estimated the cost at $1.385 per revolver, plus the cost of the new parts. With the approval of the chief of ordnance, Mordecai sought bids for the parts necessary to modify the 8,000 Model 1892 revolvers held by the army.

Hall at Colt did not appreciate having to compete with a government-owned factory. Colt was the only firm that could supply the parts on an economical basis, and they had a patent protecting their locking lever (Felton's patent 535,097, 5 March 1895). In a letter dated 5 October 1896, Hall told Mordecai:

> Your asking for these parts led us to suppose that you intend remodeling these revolvers at the Springfield Armory, which supposition was confirmed by you.
>
> What you propose doing with these revolvers is to make the Model '92 into a Model '94.
>
> In bidding for this work, we proposed to use not only these items asked for by you [hand and spring, locking lever, and locking lever screw], but in addition thereto a new trigger complete. We do not think that the element of safety is sufficiently cared for without using a new trigger as already explained to you; neither will the revolver be changed to a correct '94 Model without this new trigger.

Competition and fairness aside, there was also the issue of money. "Since we furnished you the '92 Model Revolvers we have improved same by a new patent covering a locking lever, and, while there is no question that in the '94 Model Revolvers sold you, we should be obliged to furnish you these parts for repairs, we think it is hardly right for you to ask us for the parts at repair price, in order that you may make a '92 Revolver equal to the '94," Hall wrote during October 1896. Correspondence went back and forth between Colt and the Armory and between the Armory and Washington. Ordnance officials thought that the eighty-five cents Colt was charging for the locking lever was outrageous, since they charged only ten cents for it as a spare part. The extra seventy-five cents amounted to a payment on the royalty for the lever.

Both Hall and Flagler wanted to avoid unnecessary controversy, and by November, the parties to the dispute had calmed. Ordnance Chief Flagler instructed Mordecai to accept Colt's proposal for the parts, expressing a desire not to have two distinct models of revolvers—the '92 and the '94—in service at the same time. "Even if it should be found that the revolvers without the alteration were sufficiently serviceable to warrant their issue in times of emergency they would differ so much from the present service pattern that their issue would give to the service practically two patterns of revolvers. . . ." There was still some question as to the need for a new trigger in the modified revolvers, and Colonel Mordecai won that round. The army did not purchase the triggers Colt thought were necessary. Using parts from Colt at Colt's price, the army converted 8,000 revolvers at a unit price of $1.69, a savings of more than $14,000 over the price originally quoted by Colt. By the end of fiscal year 1897 (30 June 1897), all troops except batteries of the light artillery, which

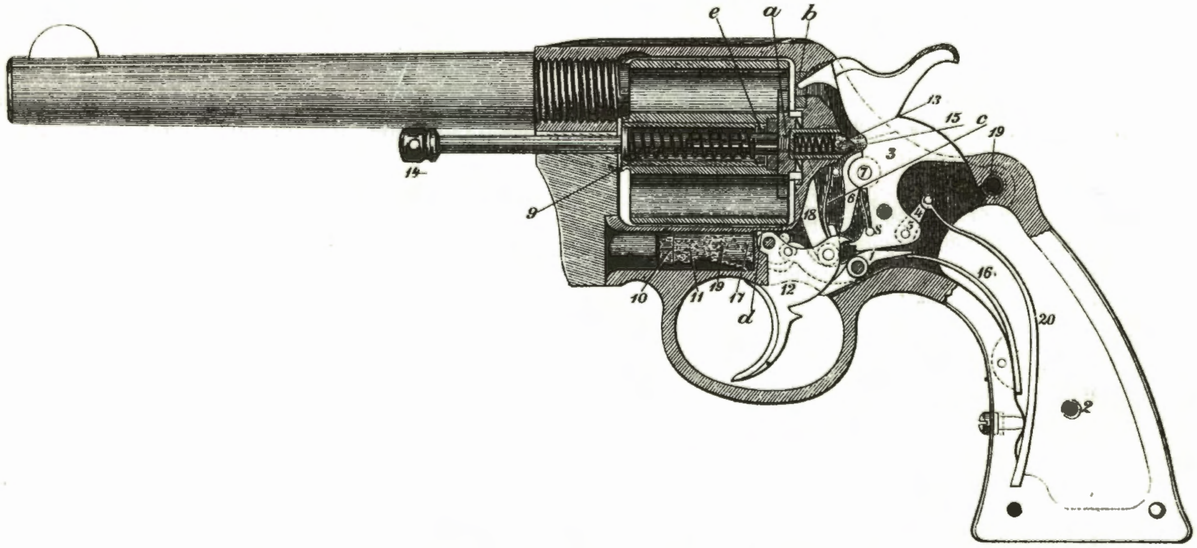


FIGURE 2–34. Model 1892 .38 caliber Colt New Army. (*U.S. Army*)

FIGURE 2–35. Colt New Army Model revolvers. *Top,* Model 1894–96 in commercial version. *Below,* 1905 U.S. Marine Corps Model. (*Colt*)

were equipped with a special model of the Model 1873 Single-Action Army,* were armed with Model 1894 revolvers, the first American military handgun for which smokeless cartridges were specified.[18]

Army-issued revolvers of the Model 1894 type had designations other than Model 1894 New Army. There was the Model 1896, identical to the 1894; the Model 1901, with a lanyard swivel added by Colt (swivels were added in the field previously); and the Model 1903, with the diameter of the bore reduced slightly from 9.22 millimeters to 9.068 millimeters to yield better accuracy and with a modified grip (width reduced by 4.76 millimeters). The Marine Corps adopted a variant of the New Army revolver of 1894 as the Model 1905, which had a rounded grip. Production of the entire series was terminated in 1908. Colt produced approximately 31,000 Navy models and 291,000 Army models, of which only about a quarter were sold to the American military. The rest were sold to the civilian market.[20]

By the mid-1890s, questions were being raised about the durability of the New Army revolver. General Flagler was the bearer of the bad news noting in his 1897 report that the rather "complicated mechanism" of the New Army required that it be handled with greater care than the old Single-Action Army. An unusual number of repairs had been necessary. Further complaining that the caliber and the weight of the bullet were "too much reduced for efficient cavalry service," Flagler recommended that when the army required new handguns, they should consider "designing a revolver which will be less complicated than the present .38 caliber pattern, to be of larger caliber and use a heavier bullet with a relatively low velocity." At this time there was still some uncertainty at the Ordnance Office in Washington about the desirability of the swing-out cylinder and double-action features. After several generations of experience with rugged, single-action revolvers, there was some concern that the merits of double-action, swing-out-cylinder revolvers might be outweighed by their apparent fragility.[21]

The engineers and designers at Colt also realized that the basic design of the New Army contained some mechanical flaws that were not easily eliminated. In inexperienced hands

*The Model 1873 was made more compact and lighter for artillery crews by cutting the barrel 51 millimeters to make it 140 millimeters. The Model 1873 had been recalled from the field in 1893; of the 16,900 returned 1,200 were modified in 1895–1896, 2,600 in 1901–1902, and 2,600 in 1903. State militia units continued to use the unaltered Model Single-Action Army.

TABLE 2-5 COLT NEW ARMY REVOLVERS

	Navy Model 1889 (reworked to 1892)	*Navy Model 1892*	*Army Model 1892 (reworked to 1894)*	*Army Model 1894/1896 1901/1903*	*Marine Corps Model 1905*
Caliber	**.38 (9.7mm)**	**.38 (9.7mm)**	**.38 (9.7mm)**	**.38 (9.7mm)**	**.38 (9.7mm)**
Overall length (mm)	**292**	**246**	**292**	**292**	**273**
Weight (g)	**936**	**NA**	**936**	**936**	**921**
Barrel length (mm)	**152**	**102**	**152**	**152**	**152**

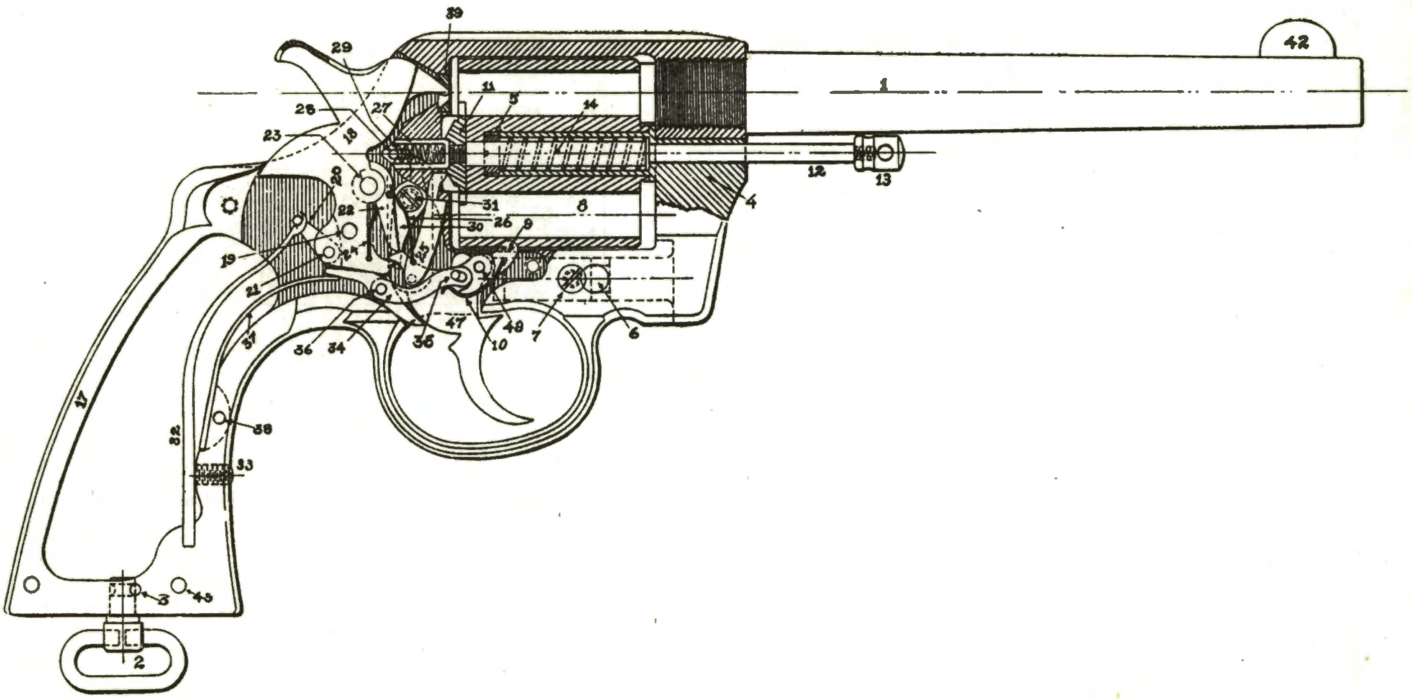


FIGURE 2-36. Model 1894 New Army revolver manufactured by Colt's Patent Fire Arms Manufacturing Company. Part 30, the locking lever, was added to prevent the hammer from falling if the cylinder was not completely closed and latched. (*U.S. Army*)

1 Barrel
2 Lanyard swivel
3 Lanyard swivel pin
4 Central arbor
5 Crane bushing
6 Crane lock
7 Crane lock screw
8 Cylinder
9 Cylinder bolt
10 Cylinder bolt spring
11 Ejector
12 Ejector rod
13 Ejector rod head
14 Ejector spring
17 Frame
18 Hammer
19 Hammer pin
20 Hammer stirrup
21 Stirrup pin
22 Hammer strut
23 Strut pin
24 Strut spring
25 Hand (pawl)
26 Hand spring
27 Latch
28 Latch pin
29 Latch spring
30 Locking lever
31 Locking lever screw
32 Mainspring
33 Mainspring tension screw
34 Rebound lever
35 Rebound lever pin (front)
36 Rebound lever pin (rear)
37 Rebound lever spring
38 Rebound lever spring pin
39 Recoil plate
40 Side plate
41 Side plate screw
42 Front sight
43 Stocks (grips)
44 Stocks (grips)
45 Stock pin
46 Stock screw
47 Trigger
48 Trigger pin

the lock work could be damaged very easily. Additionally, the cylinder turned in the wrong direction. Colt introduced the New Pocket revolver in 1893 and 1894 to eliminate these shortcomings. Externally, there was little to suggest a major alteration, but closer examination revealed that the cylinder now rotated in a clockwise direction so that the mechanism tended to keep itself closed during operation. The lock work was significantly modified, as well. While keeping the basic Nagant-type hammer, the designers of the New Pocket had eliminated the rebound lever and the two flat springs. As modified, the Colt revolver lock employed Galand's lever (mainspring auxiliary) and Galand's v-shaped mainspring. The lock side plate of the new revolver was switched to the left side of the frame. Besides the .32 caliber (7.65mm) New Pocket, Colt also added the .32 caliber (7.65mm) New Police (1896) and the large caliber New Service (1897) to their line.*

*Offered over the years in .38 Long Colt, .38 Special (introduced by Smith & Wesson in 1902), .38-40 Winchester Center Fire (WCF), .38-44, .44-40 WCF, .44 Russian, .45 Long Colt (1873 cartridge), .450 Eley, .455 Eley, and .476 Eley.

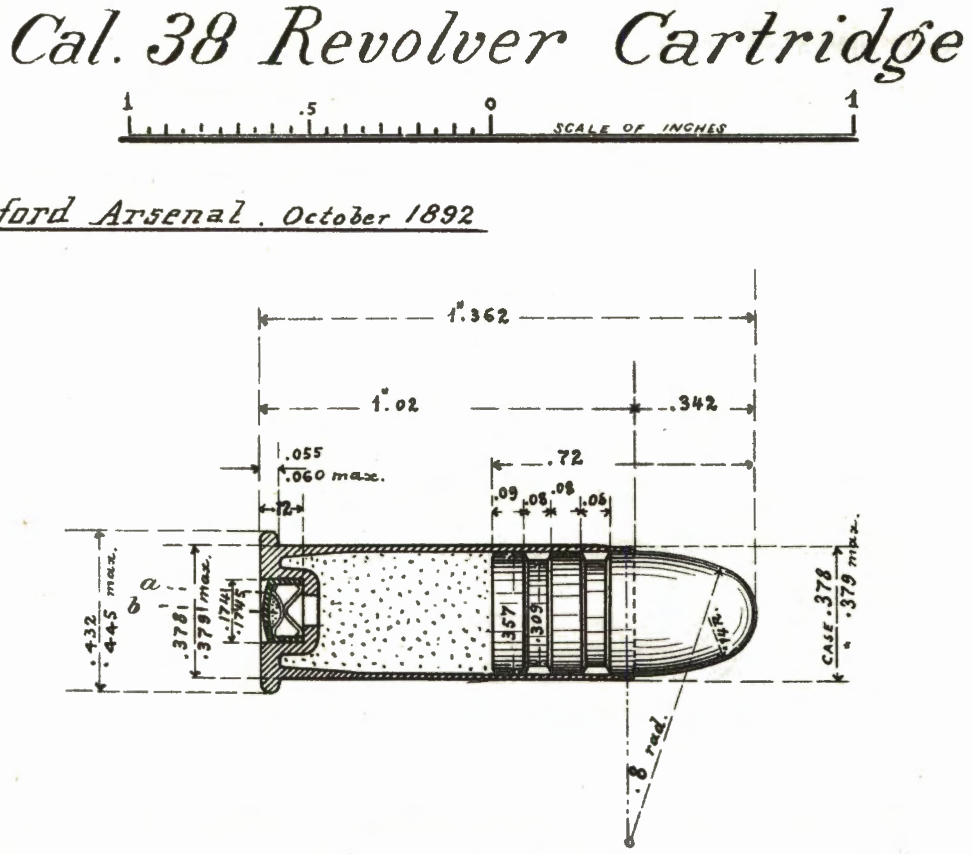


FIGURE 2–37. The .38 caliber revolver cartridge adopted by the U.S. Army in 1892. Also called the .38 caliber Long Colt cartridge, this round had a 9.0678-millimeter bullet. All dimensions in this drawing are in inches. (*U.S. Army*)

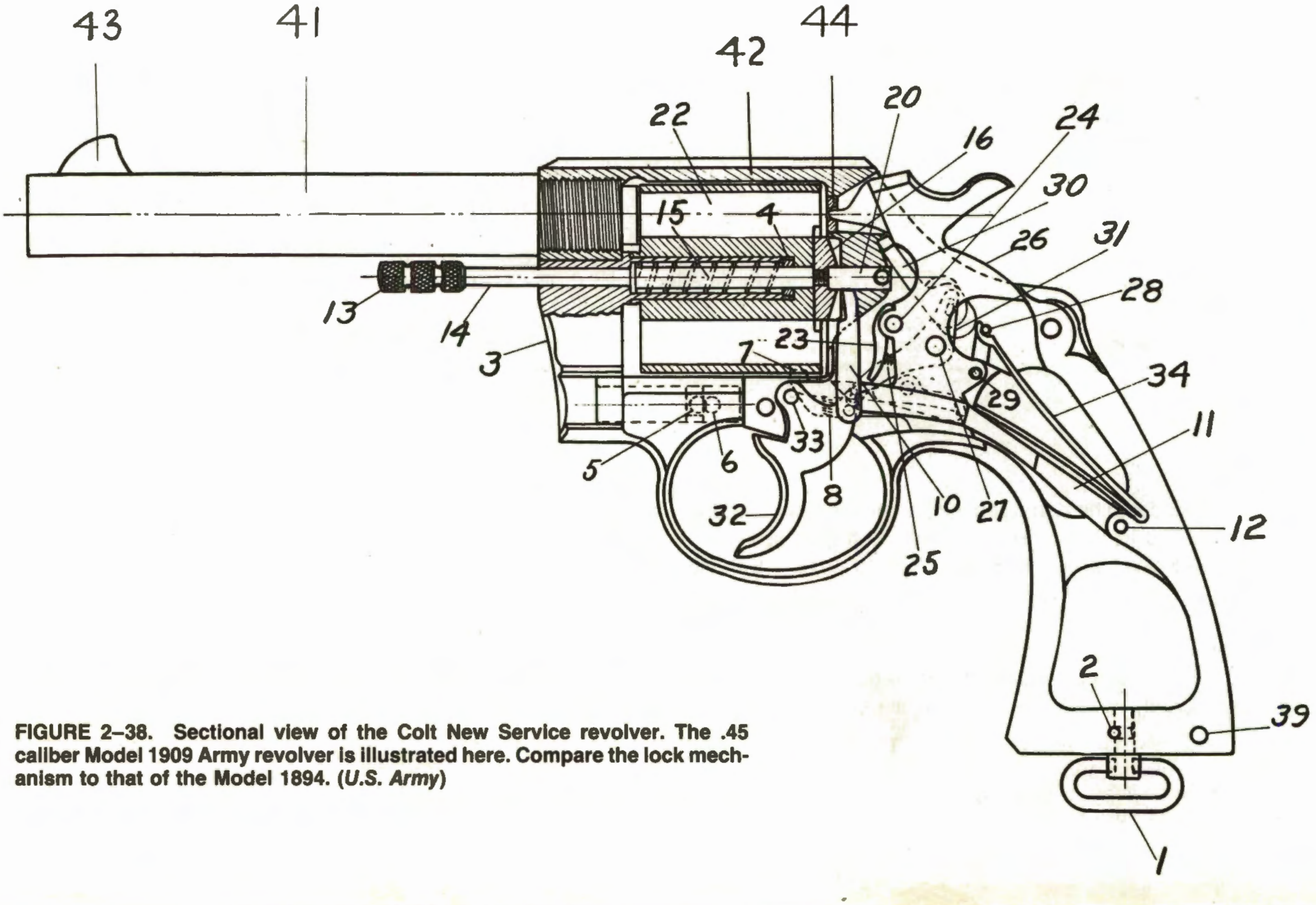
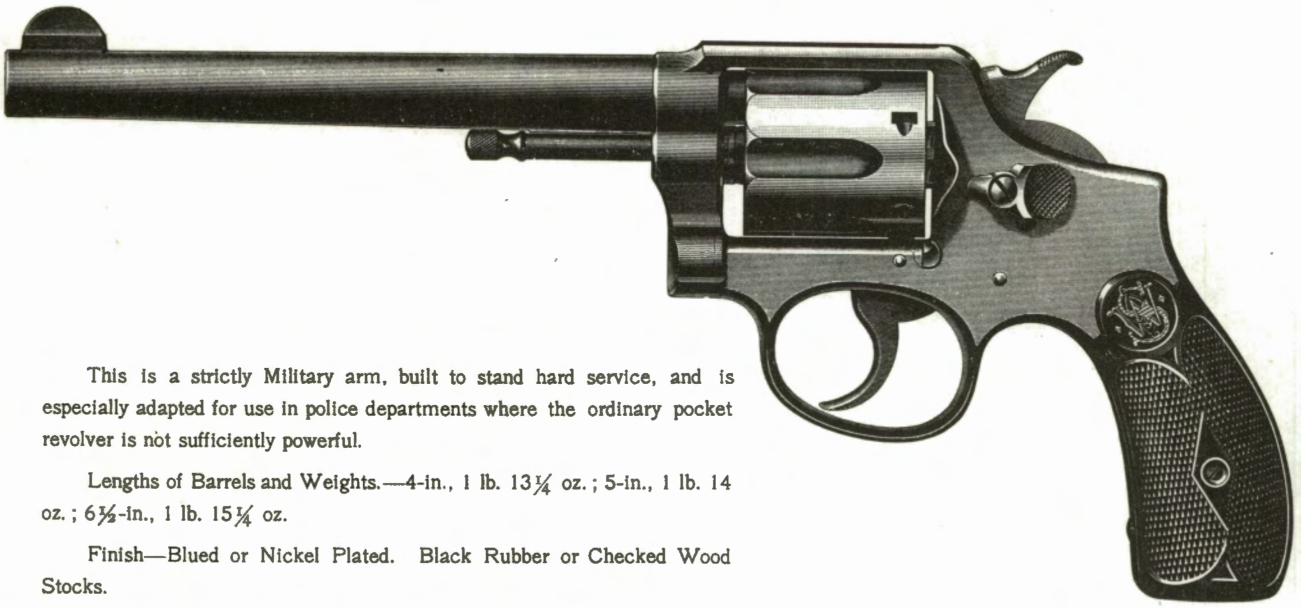


FIGURE 2–38. Sectional view of the Colt New Service revolver. The .45 caliber Model 1909 Army revolver is illustrated here. Compare the lock mechanism to that of the Model 1894. (*U.S. Army*)

.38 MILITARY.

MODEL 1899.

SOLID FRAME.
SWING-OUT CYLINDER.
DOUBLE ACTION.
SIX SHOT.



This is a strictly Military arm, built to stand hard service, and is especially adapted for use in police departments where the ordinary pocket revolver is not sufficiently powerful.

Lengths of Barrels and Weights.—4-in., 1 lb. 13¼ oz.; 5-in., 1 lb. 14 oz.; 6½-in., 1 lb. 15¼ oz.

Finish—Blued or Nickel Plated. Black Rubber or Checked Wood Stocks.

FIGURE 2–39. Smith & Wesson .38 caliber Model 1899 military revolver, the predecessor to the square-butt Military & Police revolver. (*Smith & Wesson*)

As Colt's major competitor, Smith & Wesson had also seen the virtues of the swing-out-cylinder, solid-frame revolver. In 1894, the Springfield arms maker introduced the Hand Ejector model, so named because, unlike the top-break American and Russian Smith & Wesson models that ejected the cartridges when opened, the cartridges had to be hand-ejected. In the first Hand Ejectors, the cylinder-crane assembly was unlocked by pulling forward on the extension of the cylinder pin. Two frame sizes were available—a small .32 caliber (7.65mm) frame (called the **I** frame) and a larger .32 (7.65mm) and .38 (9mm) caliber frame (called the **K** frame). The **I** frame revolver, the .32 (7.65mm) Hand Ejector Model 1896, was the first to be commercially marketed by Smith & Wesson. The Smith & Wesson revolver tested by the Ordnance Board in 1899, along with the Colt New Service Series, was the .38 caliber (9mm) **K** frame Military Model 1899 (later known as the Military and Police Model). This model had a push-forward latch on the left side of the frame to permit the release of the cylinder latch. The handguns examined in 1899 had been improved to meet the specifications required by an Ordnance Board of 1898, which had reported on the suitability of the caliber of the revolvers, the swing-out cylinder feature, the desirability of a double-action weapon, and self-loading pistols versus revolvers. Finally, the army had also wanted to know whether to replace the carbine with a new handgun. The 1898 board had recommended that the .38 service cartridge be retained, that the swing-out cylinder and double-action features were desirable, and that the self-loading pistol was not sufficiently mature as a concept to warrant adoption in place of the revolver or carbine.

In addition, the 1898 board had suggested that the handspring and bolt spring of the Colt and Smith & Wesson revolvers be strengthened and that the revolvers be "provided with a lanyard and means of attachment." Major John E. Greer and his colleagues on the 1899 Ordnance Board noted that Colt had not followed any of the recommendations but had instead "submitted a practically new revolver," which resembled the service revolver in general outline but was different in a number of respects—the cylinder revolved in the opposite direction (clockwise); the handspring had been omitted, its function being performed by a lever; the mainspring and rebound lever spring were combined in one **v**-shaped mainspring; and the latch was smaller. The Smith & Wesson revolver submitted in 1899 was similar in outline to the Colt, but had a different stock. Its cylinder revolved like that of the service revolver (counterclockwise), and it used service ammunition.

Based on tests of these two pistols at Springfield Armory, the board reported that both revolvers, while not perfect, were generally satisfactory, "except that the Colt revolver was slightly defective in the fitting of some of its parts, and some difficulty was experienced at various times, due to the fact that the cylinder revolved past the proper point before firing." It did not experience a misfire, however. The Colt tested in 1899 was an improvement over the service pattern, the board agreed, and had stronger and fewer parts. As for the Smith & Wesson, the board believed that the test results showed it to be more complicated than the Colt, but satisfactory as a potential service weapon. If adopted, it would "present the advantage of furnishing an additional source from which to

FIGURE 2–40. This commercial John Adams .45 caliber cartridge revolver was essentially the same as the 1872 Mark II revolver used in limited numbers by British forces. (*Smithsonian Institution*)

obtain revolvers in cases of emergency." The report continued: "The claims of the makers of this revolver [Smith & Wesson] seem to be pretty well born out by the results of the tests, and the substitution of spiral for small flat springs is thought to be advantageous." In concluding, the examiners noted that the Smith & Wesson was 103 grams lighter than the Colt New Service and 75 grams lighter than the Model 1894 New Army revolver, which weighed a total of 936 grams. The rounded butt accounted for the decreased weight.[22]

The first military purchase of the .38 caliber (9mm) Smith & Wesson Military Model 1899 came on 25 June 1900 when the U.S. Navy ordered 1,000. In February 1901, the army bought 1,000 Smith & Wesson revolvers for trial. Military orders for the .38 caliber (9mm) Colt New Service, however, were not forthcoming. The adoption of the .45 caliber (11.43mm) version in 1909 was the result of a reevaluation of the caliber required by American military personnel (see chapter 6).

IN THE FIELD Of the 37,035 Model 1873 Colt Single-Action Army revolvers procured by the army between 1873 and 1893, approximately 29,000 were issued to regular troops, while the remaining 8,000 were used by state and territorial militia. (As Model 1873s were replaced by Model 1892s, additional 1873s were issued to the militia for a total of 10,107.) When the Model 1873 was withdrawn from service in 1893, 16,900 were turned in to ordnance depots. This figure indicates that about 1,000 revolvers were lost each year during the period of their issue. Granting that this estimate is high (obviously not all revolvers were turned in) and noting that some significant quantities were still in the hands of the militia, this attrition rate was quite low.

During the years 1874–1893, the total troop strength of the regular army averaged about 27,500 men, with about 2,140 men in the officer corps. In 1874 when the first 6,801 Model 1873 Army revolvers were issued there were 28,640 Regulars—one Single-Action Army for every 4.2 men in the Army. Five years later, the number of personnel in army uniforms had dropped to 26,601, and 14,808 Model 1873 revolvers had been issued. Even if one subtracts 1,000 revolvers per year as having been lost in service, that would leave at least 9,800 revolvers—one for every 2.7 men. Carrying this analysis further, in 1882 and 1893, there was one revolver for every 2.8 men and in 1888 one for every 3.3 men. By comparison with most European armed forces, the United States Army issued a large number of revolvers to its troops, presumably reflecting in part the peculiar nature of fighting the Indians. By World War I, the U.S. Army handgun to soldier ratio would be 1 to 3.5; by the close of World War II it would drop to 1 to 4.7. Clearly, the late nineteenth century American army was a pistol-packing organization.[23]

British Revolvers, 1868 to 1900

As noted in chapter 1, the British armed forces adopted their first revolvers in 1854 when the Royal Navy ordered small quantities of Colt revolvers. These were .36 caliber (9mm) and fired skin cartridges. In 1855, the British government

began purchasing Adams revolvers in two calibers, 38 bore* (.50 caliber or 12.7mm) and 54 bore (.45 caliber or 11.43mm). Percussion revolvers, used in both the Crimean War and the Indian Mutiny, found much favor with those soldiers and seamen fortunate enough to have them. In 1868, British armed forces switched to breech-loading revolvers by converting existing percussion revolvers and buying new breechloaders. The Colt .36 caliber (9mm) percussion revolvers were phased out of service. Many of the .45 caliber (11.43mm) Adams revolvers were converted to fire a Boxer-type cartridge with a solid-drawn case body riveted to a base disc of iron or brass. This cartridge did not have much killing power and was regarded poorly. While the rank and file of the army could do little to rectify the ineffectiveness of the Adams cartridge, the officers could because they provided their own handguns. Many British officers purchased nonregulation pattern pistols which fired more powerful cartridges for use in the bush wars of central Africa and the engagements in Egypt, the Sudan, and the North-West Frontier of India. Against the fanatical tribesman encountered in many of these campaigns, there might not be a second chance if the first shot failed to stop the enemy. Among the privately procured pistols were single-, double-, and quadruple-barreled weapons, as well as large-bore revolvers. Calibers ranged from .45 (11.43mm) to .577 (14.66mm).

In June 1872, an official requirement was established for a new handgun for the Lancers to replace their single-shot, muzzle-loading pistols. Candidate weapons were cartridge single-shot or revolving pistols. In October, the superintendent of the Royal Small Arms Factory at Enfield Lock in Middlesex recommended several different breechloading revolvers to His Royal Highness, George William Frederick Charles, Duke of Cambridge (1819–1914) and Field Marshal Commanding-in-Chief of the Royal Army from 1856 to 1895. None of these revolvers struck his fancy. The Duke was a continuing stumbling block to those introducing new hardware. As one historian notes, he grew "ever more stubbornly resistant to change and reform as the years went by."[24] He remained in a powerful position for 40 years, however, because he was Queen Victoria's cousin.

After more complaints about single-shot muzzle-loaders† by their users, the Adjutant General on 26 January 1874 asked the Superintendent at Enfield to submit a revolver suited for use by the cavalry. Three different revolvers were suggested by the Royal Small Arms Factory—two different Tranter revolvers, both with 203-millimeter barrels, and an Adams service revolver, probably the Mark III. A double-barreled pistol submitted by the Wilkinson firm at about the same time was a great favorite with officers commanding Lancer regiments. A War Office committee was convened in December 1874 to evaluate these weapons and conduct trials.§

After nearly two years, the committee decided in October 1876 to procure and issue 25 double-barreled, breech-loading pistols for trial with the 5th, 16th, and 17th Lancers. Generally unfavorable reports were received back by the following April. But after more than five years of indecision, the Adjutant General was advised to adopt the Adams revolver for the cavalry. On 13 November 1877, the secretary of state for war approved the issuance of revolvers in place of muzzle-loaders for the staff sergeants and trumpeters of all cavalry regiments and for all Lancer personnel. The next year because of the small quantities of Adams revolvers available, the government also ordered some Tranter revolvers, and by mid-July 1878 army and navy officials had agreed to a standard (sealed) pattern for the Pistol Breech-Loading Revolver Tranter. The Adams and the Tranter were the only breech-loading revolvers in British service until 1879, when Colonel F. Close, superintendent of the Royal Small Arms Factory (1875–1880), began to lobby for an improved revolver with a more powerful cartridge.

Dissatisfied with the large variety of handguns in service by British forces, Colonel Close reported that in March, Enfield had purchased 235 Tranters, 165 Colts (Model 1873s?), and 100 Webley revolvers. But Enfield was designing a new revolver to replace all these. The first sample was taken to the War Office on 10 October 1879 and given to the captain of the *Excellent,* the Royal Navy's Gunnery Establishment, for the navy's evaluation. The Enfield Mark I was a six-shot, top-break, double-action revolver that embodied an unusual cartridge extraction system. When the barrel was hinged down, the cylinder was pulled forward, but the extractor remained behind. In effect, the cylinder was pulled away from the empty cartridges. The captain of the *Excellent* noted in his report on trials with this new weapon that it "appears strongly made and works satisfactorily, the loading and extracting being easier than with the service [Adams] pistol, the only fault being that in extracting the empty cartridges the lower one hangs, the cylinder having to be revolved to clear it."[25] Although extraction of all the cartridges was performed simultaneously, loading was accomplished one round at a time through a loading gate on the right side of the revolver.

As with so many revolvers produced in this era, the design was a collection of ideas worked into a new package. Owen Jones, a Welshman who emigrated to Philadelphia, contributed the extractor idea, which was covered by United States (200,794, 26 February 1878) and United Kingdom (2,777, 7 July 1876) patents. Lock work for the Enfield Mark I was derived from the work of Julien Warnant of Liège and Michael Kauffman of England (British patent 5,031, 9 December 1878), although the authorities at the Royal Small Arms Factory never recognized this claim or paid royalties under the patent.[26]

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*Not to be confused with caliber, bore indicated the number of lead balls per pound (.454 kg.). Thus 38 bore equaled 38 balls to the pound, while .38 caliber equaled .38 of an inch (9.7mm) diameter.

†In 1872, four .45 caliber (11.43mm) revolvers were in service with the Royal Navy: Pistol BL Revolver Adams Mark I, converted percussion weapons approved in breechloading form in 1868; Pistol BL Revolver Adams Mark II, approved in 1872; Pistol BL Revolver Adams Mark III, approved in 1872; and Pistol BL Revolver Adams Mark IV, converted weapons approved in 1872.

§Members were Director of Artillery, Inspector-General of Musketry, Assistant Adjutant General, Superintendent of the Royal Laboratory at Woolwich, and Superintendent of the Royal Small Arms Factory; the superintendents were given the responsibility for conducting trials.

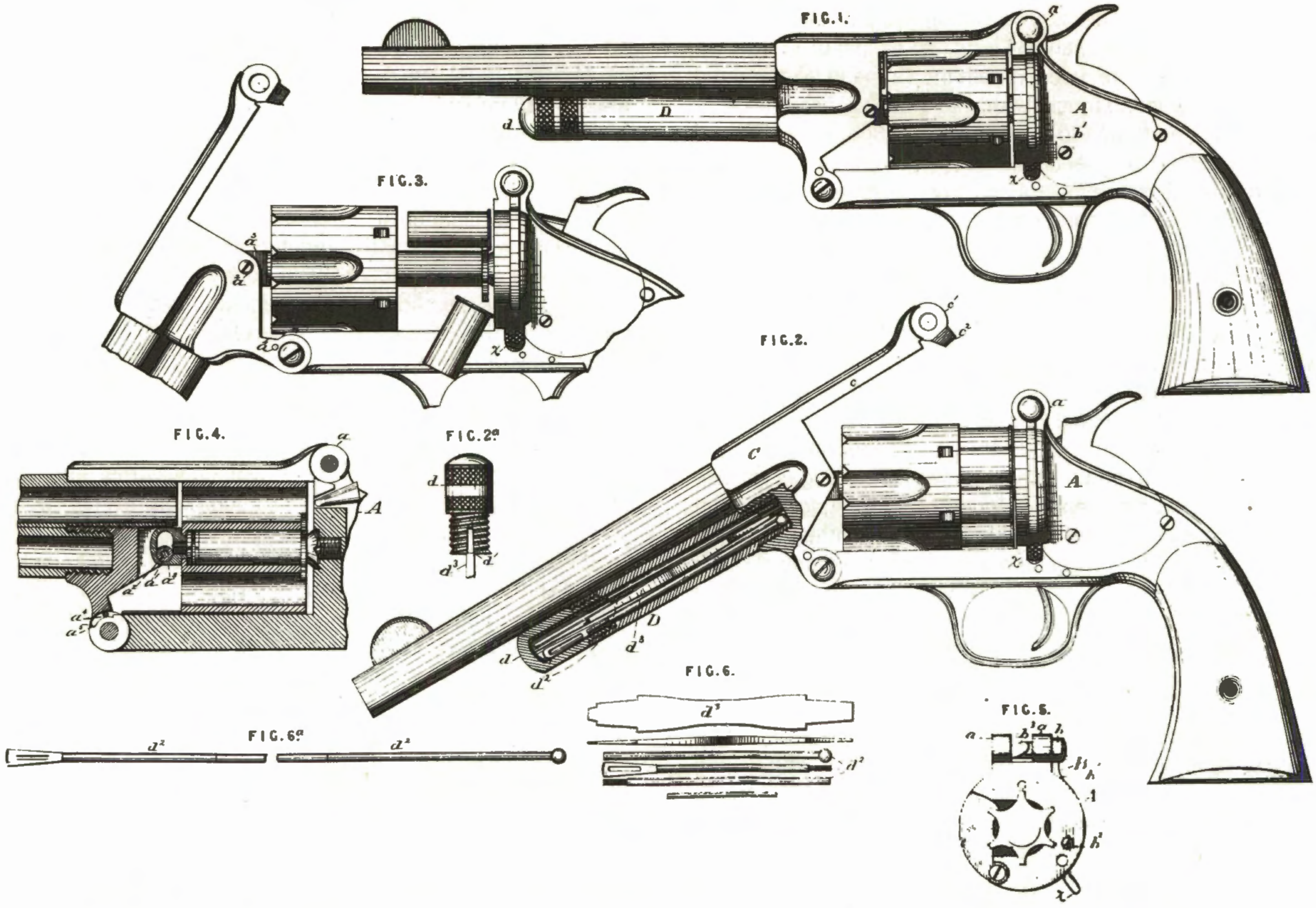


FIGURE 2–41. Owen Jones' extraction as illustrated in British patent number 624 of 1878. (*British Patent Office*)

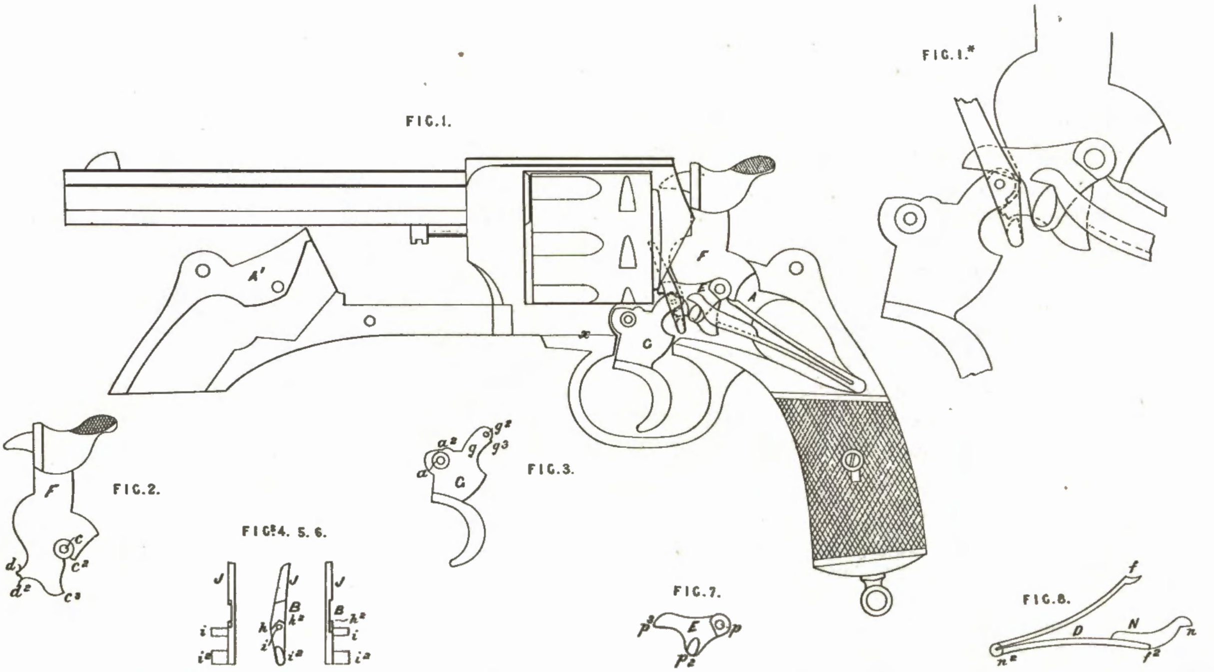


FIGURE 2–42. Kaufman and Warnant British patent number 5,031 of 9 December 1878 for their revolver lock mechanism. Compare with drawings of the Enfield revolver. (*British Patent Office*)

FIGURE 2–43. The Pistol, Revolver, B. L., Enfield (Mark I), interchangeable. (*Tokoi*)

In forwarding his report of 6 February 1880 on the tests of the Enfield revolver, the director of naval ordnance told the director of artillery that the lock work was especially praiseworthy. After the usual minor modifications and an expeditious handling of the bureaucratic details, the new handgun was adopted on 10 August 1880 as the Pistol, Revolver, B. L. Enfield (Mark I) interchangeable. Nickel plating some of the parts of the revolver as was suggested initially was abandoned to simplify the manufacture of the weapon.

As troops began using the Enfield, some minor problems were discovered. To correct these problems, on 27 August 1881, Colonel Arbuthnot, the new superintendent at the Royal Small Arms Factory, submitted a modified version of the Mark I for adoption. Major changes included (1) rounding the front sight "to prevent it catching and cutting the holster"; (2) tapering the bore of the cylinder so that it was .51mm smaller in diameter at the muzzle end of the cylinder to lessen the chance of projectiles "being jerked forward by discharge of a previous cartridge"; (3) modifying the frame to make the top strap an integral part of the forward frame instead of a welded piece; and (4) altering the wooden grip and eliminating checkering on the grip. Several of these changes simplified and reduced the cost of making the revolver, and Colonel Arbuthnot estimated the savings to be 2 shillings, 6 pence (about sixty cents) per revolver. Even more significant than these changes was the addition of a swivel to the lever (cylinder lock; fig. 2–45,16) to prevent the revolving of the cylinder when the weapon was in the holster. Cocking the pistol released the swivel and permitted the cylinder to revolve, "so that the hammer is sure to come down on an unfired cartridge," provided there is still one in the cylinder. This cylinder-locking mechanism was linked to the loading gate, called a shield by the British, so that the cylinder could turn when the gate was open for loading cartridges, but the hammer was locked to prevent accidental discharging.

After coordination with Royal Navy officials, the surveyor general of the ordnance approved the new pattern revolver on 13 March 1882 as the Pistol, Revolver, B. L, Enfield (Mark II), interchangeable. In July 1887, a safety device was added to all Mark I and Mark II revolvers that prevented the hammer from being forced forward in the event of the weapon being dropped or something striking the hammer. An improved safety was introduced in 1889, the year that production of the Enfield revolver was terminated.

The addition of this safety was the result of an accident off Melville Island, in the Arctic reaches above the Northwest Territory of Canada. The crew of HMS *Flying Fish* was surveying the south coast of the island when they were threatened by a band of natives armed with spears. On 3 November 1886, Lieutenant H. E. Rooper, Royal Navy, armed with a Mark I Enfield, went ashore to place a survey marker. When Rooper returned to the whale boat that would carry him to the *Flying Fish,* he paused for a moment and "leaned over the gunwale in order to let the water run out of his boots; his pistol fell from the pouch and struck the bottom boards muzzle up, went off and the bullet passed through Lieutenant Rooper's head; the fall in this case could not have exceeded two feet [0.6 meter]."

In reporting Rooper's death, the captain of the *Flying Fish* commented, "I have since then experimented on the pistols

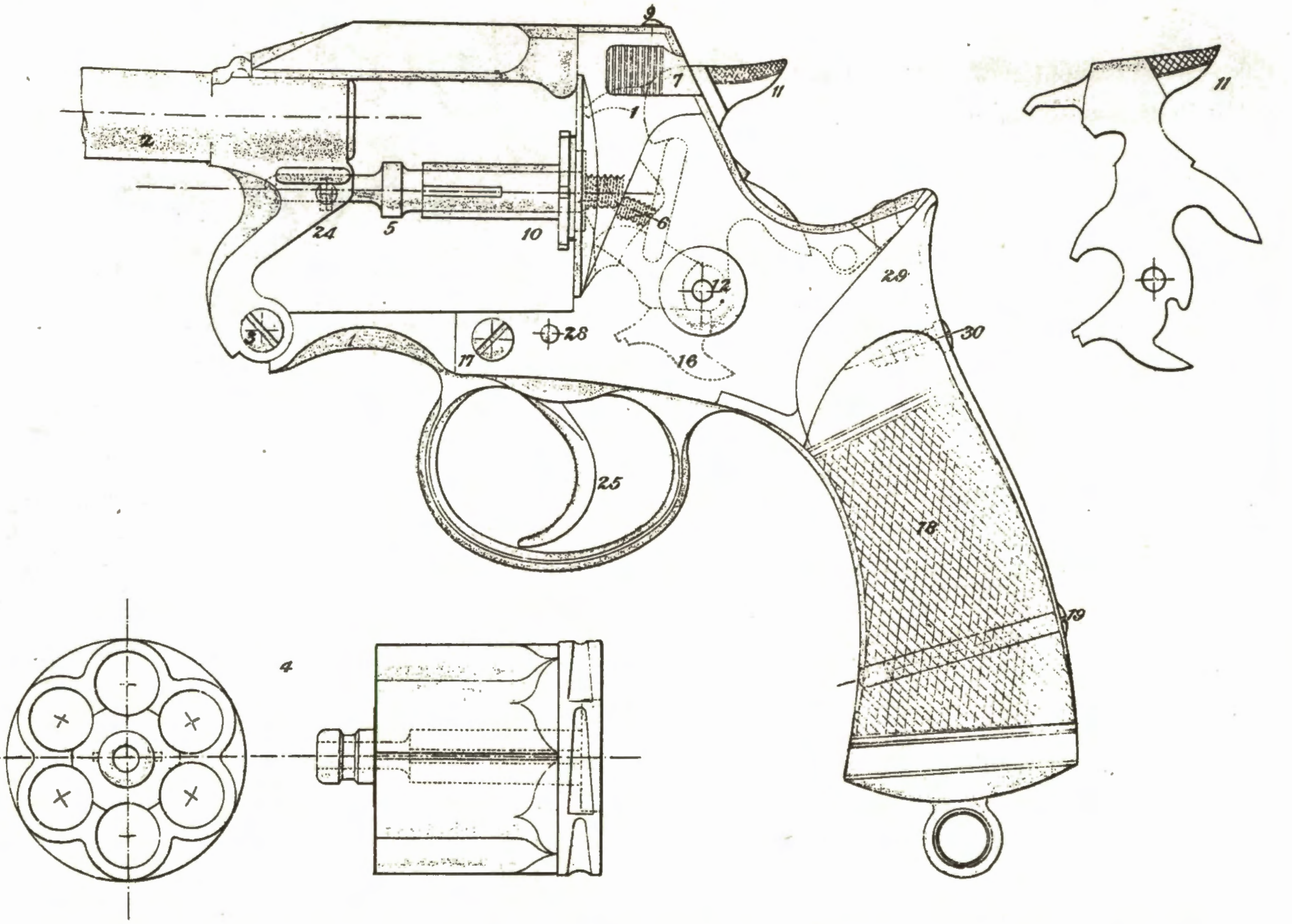


FIGURE 2–44. The Pistol, Revolver, B. L., Enfield (Mark I), interchangeable in .476 caliber. (*After a Royal Army drawing*)

1	Frame	*9*	Frame latch screw	*19*	Stock screw
2	Barrel	*10*	Extractor	*24*	Swivel studs
3	Barrel hinge screw	*11*	Hammer	*25*	Trigger
4	Cylinder	*12*	Hammer screw	*28*	Trigger screw
5	Cylinder pin	*16*	Side plate	*29*	Backstrap
6	Cylinder pin screw	*17*	Side plate screw	*30*	Backstrap screw
7	Frame latch	*18*	Stock (grip)		

(Enfield, Mark I.) and find that they can be easily fired by a blow on the hammer, either from a stick or by a fall." The captain also discovered that it was not easy to discharge the revolver in its holster because "the stiff leather wards off a blow near the top strap from the hammer, but under certain conditions a blow will fire it even in the pouch." Subsequent tests at the Naval Gunnery Establishment indicated that there was indeed a safety hazard with the Enfields. After experimenting with safety devices and some wrangling between the crew of the gunnery establishment and the personnel at the Royal Small Arms Factory, a safety for the Enfield revolver was approved in July 1887.

The significant difference between the Enfield and the earlier breech-loading revolvers was the ammunition. Until the proper Enfield rounds were manufactured, the old Adams .450 (11.18mm) ammunition was authorized for the Enfield. The new cartridges were quite different, with a large-capacity, solid-drawn case and a heavier bullet. Because of poor performance, however, the Enfield Mark I and II cartridges (.455 caliber with 11.5-millimeter bullet diameter) were little used. It was the Mark III ammunition in .476 caliber with a 12.1-millimeter-diameter bullet that was more widely utilized. The Mark III bullet weighed 17.2 grams, compared to the 14.6-gram Adams bullet.

Neither the Mark I nor the Mark II Enfield revolver was received with much enthusiasm. Critics called the weapon clumsy and inaccurate. While personal prejudices have great influence in the acceptance of any small arm, it must be noted that the Enfield was heavy (100 grams more than the American Model 1873 Single-Action Army) and the extraction left much to be desired. One of the leading critics of the Enfield revolvers was Lord Wolseley (1833–1913; Sir Garnet Joseph Wolseley), adjutant general from 1882 to 1890, responsible for the military training of the army. Lord Wolseley expressed his thoughts to the surveyor general on 2 July 1886. "When at Enfield a few days ago I mentioned that the pattern of the service revolver was very heavy and inconvenient when compared with the pattern in use by the Irish Constabulary. I send you rather an old pattern revolver (bulldog pattern, by Adams) of my own to enable you to judge between it and the regulation

1 Frame
2 Barrel
3 Cylinder
4 Cylinder arbor pin
5 Frame latch
6 Stock cap
7 Extractor
8 Hammer
11 Side plate
13 Shield
14 Stock (grip)
16 Swivel, lever
23 Stock cap screw
25 Hammer screw
26 Cylinder arbor pin screw
27 Shield screw
28 Plate screw
29 Plate screw
30 Shield spring screw
31 Trigger screw
32 Trigger
33 Safety bar

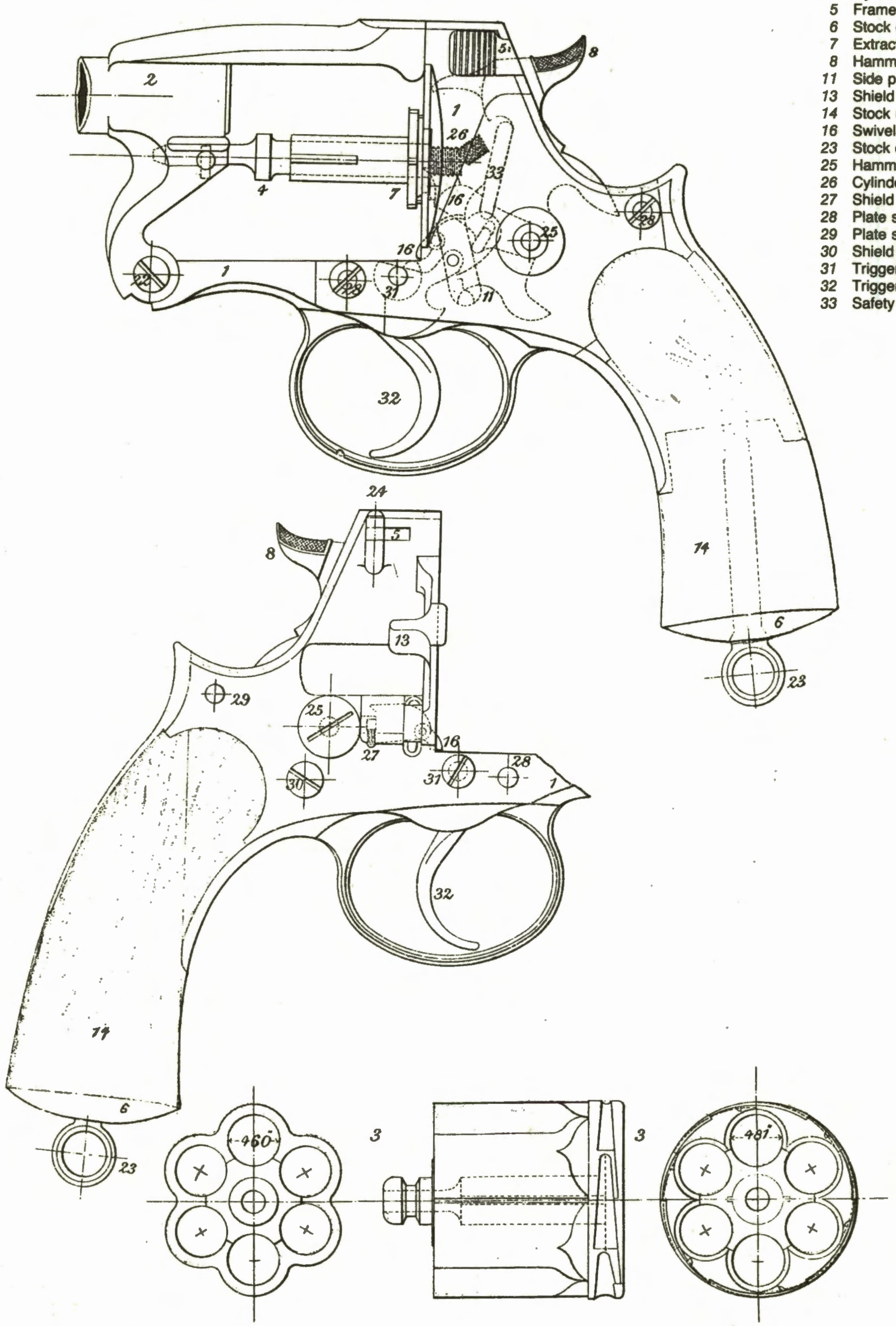


FIGURE 2–45. Pistol, Revolver, B. L., Enfield (Mark II), Interchangeable in .476 caliber. (*After a Royal Army drawing*)

FIGURE 2–46. Pistol, Revolver, B. L., Enfield (Mark II), interchangeable in .476 caliber. (*Metropolitan Police*)

pattern." (This model of the Adams had seen some improvement since it had first been manufactured.) Lord Wolseley reminded the surveyor general that "a revolver is intended to kill an enemy who is within a few yards of you, so that good shooting at even 20 yards [18.3 meters] is not required from a pistol." He added that a pistol was a defensive rather than an offensive weapon. He wanted a short-barreled, reasonably-lightweight, large-caliber, double-action revolver.

There are some significant assumptions embodied in the adjutant general's memo. First, a handgun should be compact and lightweight. The Royal Irish Constabulary (R.I.C.) revolvers had barrels ranging from 83 millimeters to 114 millimeters in length, compared to the 149-millimeter barrel of the Enfield. Lord Wolseley's Adams revolver weighed 758 grams, the Enfield 1,150 grams. Second, the handgun was intended to be used in close quarters; the bullet should, therefore, hit a man with sufficient force to prevent him from being a further threat. Third, the pistol was a weapon of personal defense, not one for the offense. All of these points were well taken for infantry usage, but what about the revolver as a cavalry weapon? Clearly, distinction was being made between pistols used for personal defense by ground forces and revolvers used in offensive operations by mounted troops. With Lord Wolseley, the former was the more important role, and his opinion led to the adoption of a short-barreled revolver.

The director of artillery ordered sample revolvers from P. Webley & Son and Adams & Company chambered to fire both Enfield and Adams ammunition. The director of artillery also asked the director of naval ordnance in July 1886 for Royal Navy opinions about a handgun, who responded with the following requirements for an efficient naval revolver: (1) rapid, simple loading and extracting that can be carried out in the dark and in cold weather; (2) large enough bore that is sufficiently accurate for use at ranges to 13.7 meters; and (3) weight no heavier than 907 grams. These requirements would help overcome some of the defects the navy had found in the Enfields: (1) unsatisfactory extraction of empty cartridges due to the limited amount of movement in the cylinder (which was "to enable the pistol to be opened for the extraction of . . . one empty cartridge without permitting the other five loaded ones to fall out."); (2) awkward loading operation (". . . almost impossible when the fingers are cold, or it is dark."); (3) too heavy and too long; and (4) too great a distance between the front end of the cylinder and the rear end of the barrel (". . . the escape of powder gas at this point prevents the use of the left hand to steady the pistol when firing"). When the adjutant general received a copy of the navy's report, he was pleased and believed that there should be no difficulty in obtaining a pistol suitable for both the army and the navy. Lord Wolseley's concurrence came on 30 July 1886.

Meanwhile at the Royal Small Arms Factory, the Adams bulldog model pistol had been tested. As an Enfield report noted, the velocity of the Adams bulldog revolver was con-

TABLE 2-6 COMPARISON OF ENFIELD AND ADAMS REVOLVERS

	Enfield Mark II	*Adams Bulldog*
Caliber	.476 (12.1mm)	.450 (11.18mm)
Weight (grams)	1,150	580
Length of barrel (mm)	152	63.5
Velocity (m/sec)	169	98

siderably less than that of the Enfield, "but that was to be expected with such a short barrel; and its accuracy also is inferior, from the same cause. It is a nice, light, handy and well-made revolver, and the action worked freely and well." The testing officers also indicated that the Enfield revolver recoiled excessively. It was suggested that if the Adams ammunition was used with the Enfield, less recoil resulted thus ensuring accuracy at short ranges. It would have been interesting to see how the British experts would have rated the American Model 1873 Single-Action Army, which fired a bullet the weight of the Adams cartridge, 14.9 grams, with a velocity of about 223 meters per second. While critical of the recoil, they would have had to acknowledge that the American round stopped men and horses dead.

Comparing the Adams and the Enfield was just the beginning of the trials. On 24 August 1886, Colonel Arbuthnot at the works in Enfield reported on a Webley bulldog revolver. "It can be easily loaded by a mounted man, the extraction is good, and the pistol is well made in every way. The barrel is shortened. It is constructed to fire the Enfield pistol ammunition, and therefore the weight of the pistol is greater than is desired . . ., the weight being 2¼ lbs. [1,020 grams]." Obviously, its weight could be reduced if made for the Adams round. Colonel Arbuthnot went on to say that should the government adopt Webley's existing model, deliveries could commence within a few weeks, with about 1,000 being delivered during the current fiscal year. "If, however, he has to alter his pattern so as to make his pistol available for lighter ammunition only, this will necessitate an entire re-arrangement of his machine fittings, and it will probably be eight or nine months before any deliveries commence. I should add that Webley's is the only firm in England who have got a plant for turning out interchangeable pistols in any quantities."

Both the Adams and the Webley were sent to Lord Wolseley, and neither satisfied him. As a consequence, the adjutant general called the director of artillery and the superintendent of Enfield to meet with him to discuss the matter again. This led to the adoption of an official mandate for a new pattern revolver on 20 October 1886. The following February, Arbuthnot told Lord Wolseley that the new pistol was ready for trial. It weighed 850 grams and had a 102-millimeter barrel. A special cartridge was made for the "self-extracting Webley-pattern" with a charge of 1.17 grams, a bullet weighing 14.4 grams, and a muzzle velocity of over 213 meters per second. Its accuracy was reportedly very good, and it could also fire the Adams cartridge.[27]

WEBLEY REVOLVERS In 1845, Philip Webley (c. 1813–1888) started in the gun trade by purchasing the business of William Davis, a Birmingham gun implement manufacturer. By 1853, Philip and his brother James were fabricating percussion single-action revolvers (British patent 743, 29 March 1853). The firm later made pin-fire, rim-fire, and center-fire revolvers as the new ammunition types became available.[28] About 1865, the Webleys introduced a tip-up hinged-frame revolver in .30 caliber (7.62mm) rim-fire. This revolver was almost identical to the Smith & Wesson Model 1, and it is believed that the Webley firm had a license to manufacture the Smith & Wesson pistol. Webley also produced several of their own cartridge designs in about 1865.

Webley's first breech-loading model was a six-shot, single-action, solid-frame pistol in .45 caliber (11.43mm), followed by a double-action, center-fire revolver firing the extremely powerful .577 Boxer pistol cartridge (14.7 × 31.1mm). In 1867, P. Webley & Sons—Thomas William and Henry Webley joined the company in the 1860s—introduced

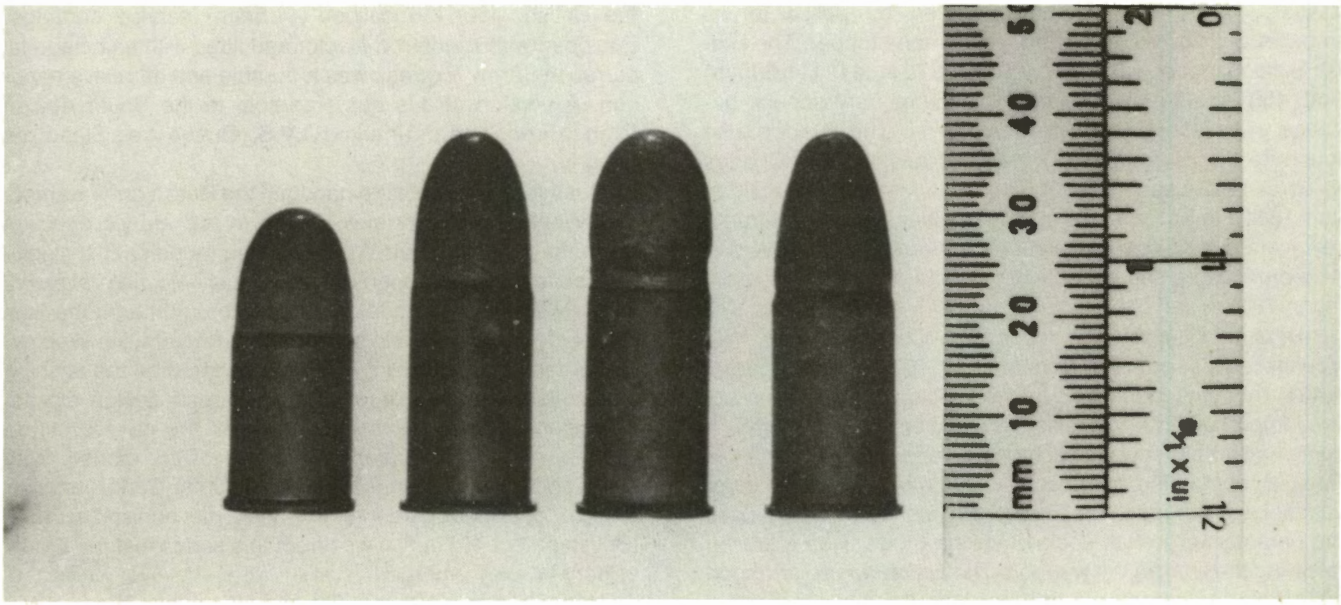


FIGURE 2–47. British handgun cartridges, 1868–1894. (*Left to right:* .450 Adams Mark I (11.43 × 17.31mm) with a 14.6-gram bullet; approved 21 December 1868; obsolete 23 August 1894. .455 Enfield Mark II (11.56 × 21.84mm) with a 17.2-gram bullet; approved 30 November 1880; obsolete 26 September 1892. .476 Enfield Mark III (12.09 × 21.84mm) with a 17.6-gram bullet; approved 10 December 1881; obsolete 26 September 1892. .455 Webley Powder Mark I (11.56 × 21.84mm) with a 17.2-gram bullet; approved 29 July 1891; obsolete 6 August 1912. A cordite cartridge was introduced in 1894. (*Labbett*)

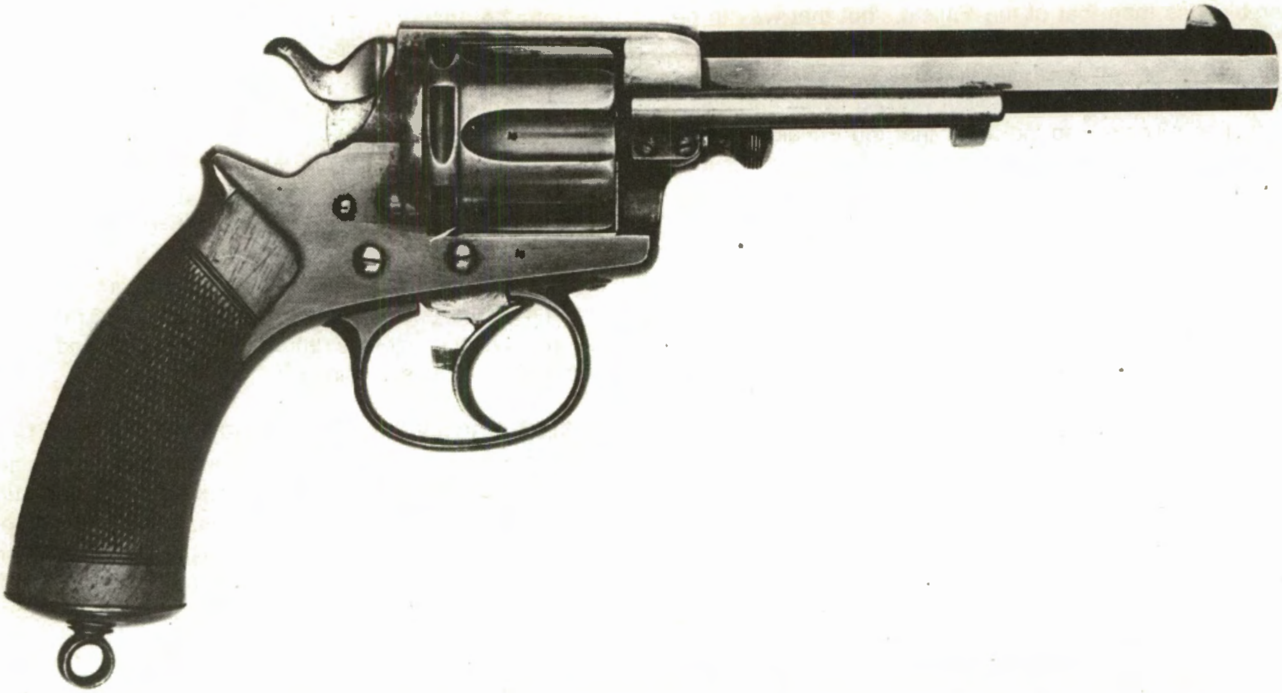


FIGURE 2–48. Webley Army Express caliber .450/.455 Model 1878, a six-shot, double-action revolver. (*Tokoi*)

a six-shot, double-action, solid-frame revolver that was destined to be a best-seller for a long time. It gained fame as the Royal Irish Constabulary Model (R.I.C.). When that paramilitary police force was established in 1868, the Webley revolver in .442 caliber Boxer (11.23mm) was selected as its handgun. Still in production at the end of the century, the R.I.C. model was also adopted by colonial police in Australia and South Africa. A similar Webley six-shot weapon in .450 caliber (11.43mm) was later adopted by police forces throughout England as a short-range man-stopper. The British Bulldog model was introduced in 1878 in .442 (11.23mm) and .450 (11.43mm) calibers and became very popular because of its short 63.5-millimeter barrel. The Bulldog also found its way to America. (It was this revolver that Charles Jules Guiteau used to shoot President James A. Garfield in July 1881.) In addition to this very popular line of solid-frame revolvers in a variety of calibers and barrel lengths, Webley also produced a self-extracting, hinged-frame revolver starting in 1877.

Another English gun designer, Charles Pryse, the Younger, was granted a patent in 1876 (British patent 4,421) that was significant to the Webley story because of two improvements to existing revolver mechanisms it contained—the rebounding hammer and the cylinder lock. Pryse's rebounding hammer was his most important innovation. He arranged the mainspring in such a way that it lifted the hammer up to half-cock when the trigger was released following the firing of the weapon. The action was so arranged as to hold the hammer in that position, thereby rendering it impossible for the revolver to be discharged by a blow to the hammer.* This modified hammer mechanism was obviously a very desirable addition. The Pryse cylinder lock was another attempt at properly aligning and locking the cylinder at the instant the cartridge was fired.

In 1878, Webley introduced the Army Express model, a six-shot, double-action, solid-frame revolver with a 152-millimeter barrel. This weapon was contemporary with the Colt Model 1878 Double-Action Army and was chambered for the British .450/.455 caliber (11.5mm) service cartridge. Equipped with a side-rod ejector and fitted with an octagonal barrel, the Army Express was a durable and attractive handgun. A version of this gun was sold to the South African Orange Free State and marked O.V.S. (Oranje Vreie Staadt) on the grip.

But this was still not the handgun the British army wanted. The Webley company took a step in the army's direction when they created their Webley-Green models. This significant series of break-open simultaneously-ejecting revolvers began with the first model in 1882 and ran through the final model of 1896. Generally called W.G. revolvers, the Webley-Green family of revolvers was distinguished by the latching mechanism used to keep this break-open design closed. Edwinson C. Green was the creator of the pivoted stirrup latch, which all subsequent Webley revolvers carried. With some controversy, Henry Webley and John Carter, another English designer, patented this lock mechanism in 1875 (British patent 4070).[29] It was from this series that the British military Webley emerged.

Henry Webley (1846–1920) and his brother Thomas William (1893–1904) believed that any successful service re-

*D. B. Wesson patented a similar device (British patent 4831, 19 December 1877, and U.S. patent 202,388, 16 April 1878).

volver must be made on a nearly perfect interchangeable parts system. As noted in chapter 1, interchangeability of parts was not an immediate consequence of producing handguns by machine. Power tools could reduce labor, but precision gauging and careful, continuous adjustment of machine tools were also essential if true interchangeability were to be achieved. Henry Webley surmised that long-term government contracts could only be obtained by promising genuine interchangeability. This meant that during the service life of a given revolver changes to its basic pattern must be kept to a minimum, and no changes could be made that would destroy the interchangeability of basic components.

For a military force such as that of Great Britain with her far-flung empire, parts interchangeability for its weapons was not a luxury, but an absolute logistical necessity. Armorers assigned to a British military unit, whether it be located in the Sudan, India, Singapore, or Hong Kong, were expected to "execute all repairs required to the arms (including lances, pistols, swords, and scabbards) in possession of their respective units." They also performed any other work, within their capabilities, required to keep the equipment of their units in working order.[30] In many colonial situations, there were "circuit armourers" who traveled a specified district repairing materiel as they went. Under such circumstances, revolvers and other weapons had to be fixed on the spot in the shortest amount of time through the allocation of the smallest number of spare parts. Interchangeability was a blessing. It should be noted also that large series production made it affordable. When the British War Office ordered 10,000 Webley revolvers in 1887, the large order made interchangeable parts a reasonable goal, whereas a smaller order would have made it too expensive an undertaking to be practical for producer or user. The price of the first Webley military revolver was roughly comparable to that paid by the U.S. Army for the Model 1873 Single-Action Army or the Model 1892 New Army.

Thomas Webley had made a survey of machine tools available in England and the United States in the 1800s and decided that the task of manufacturing the military Webley required tailor-made production equipment, the bulk of which he purchased in Birmingham. In February 1887, the superintendent of Enfield submitted a Webley revolver to Lord Wolseley that would serve as the pattern for the military handgun. Four months later on 18 July, the Royal Army contracted with Webley for 10,000 Mark I Webley revolvers for £30,500, or 61 shillings each (approximately $14.85 each).* Considering tooling costs, the price was a reasonable one.

The Webley was a milestone. For the next half-century this revolver remained the basic handgun of the British armed services. For the first time, the British soldier had a revolver that stood comparison with any in service elsewhere, and he probably needed it most. No army in the world saw as much active service in the nineteenth century as the British army. Extremes of climate—from the arctic conditions of Canada and the burning heat of the Sudan—characterized the service

*The Model 1873 Single-Action Army cost the U.S. Army $12.50; the Model 1892/1894 New Army would cost $12.00.

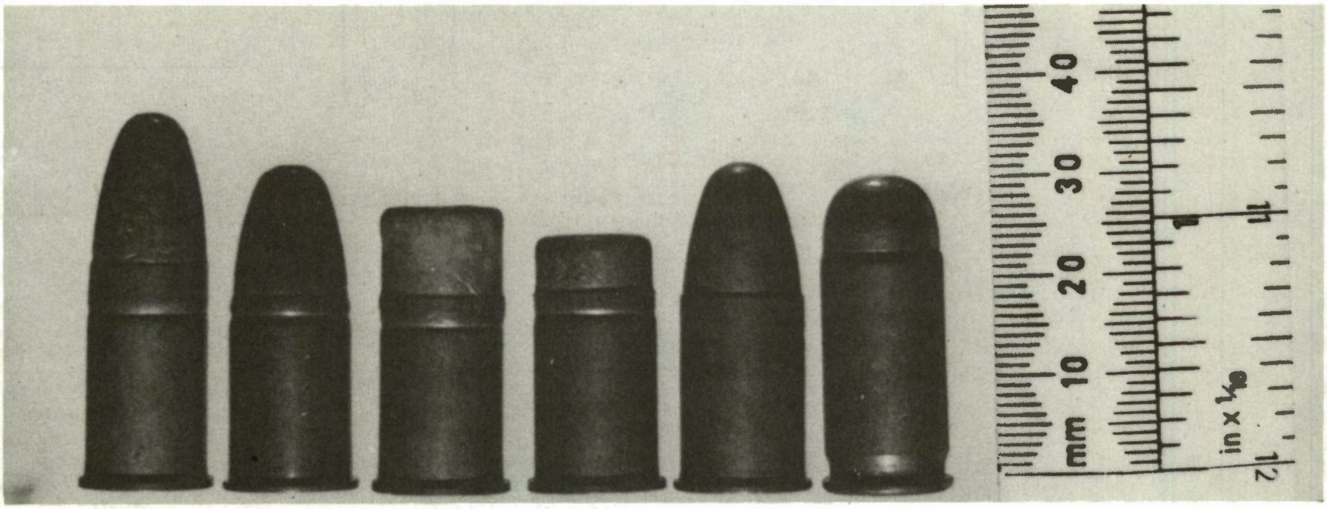
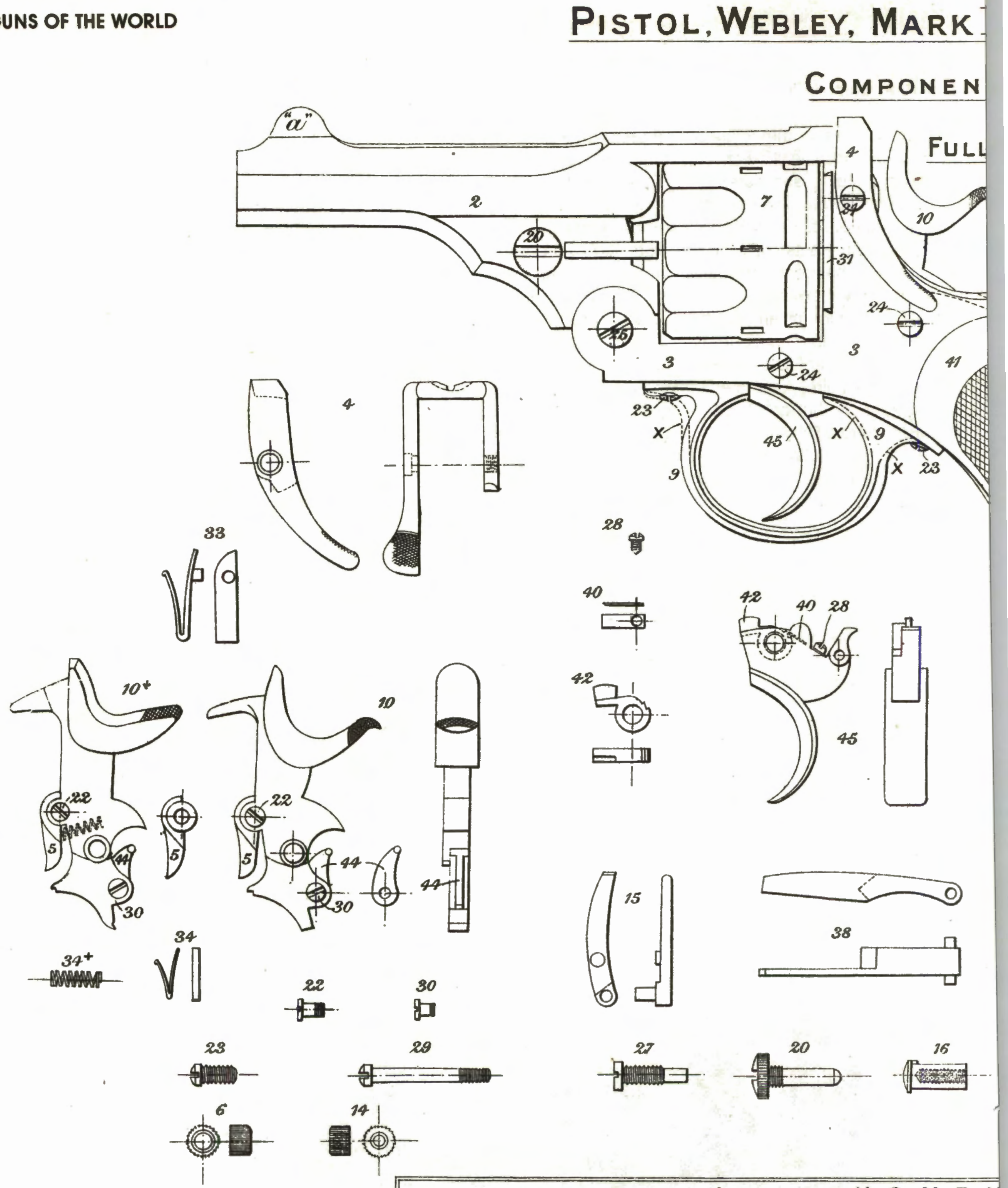


FIGURE 2–49. British handgun cartridges, 1894–1946. ***Left to right:*** **.455 Webley Cordite Mark I (11.5 × 19.3mm) with a 172-gram bullet; approved 14 September 1894; obsolete 19 March 1946. .455 Webley Cordite Mark II (11.5 × 19.3mm) with a 17.2-gram bullet; approved 5 February 1898; obsolete 18 September 1939. .455 Webley Cordite Mark III (11.5 × 19.3mm) with a 14.12-gram bullet; approved 5 February 1898; obsolete 18 November 1902. .455 Webley Cordite Mark IV (11.5 × 19.3mm) with a 14.25-gram bullet; approved 20 May 1902; obsolete 1914. .455 Webley Cordite Mark V (11.5 × 19.3mm) with a 14.25-gram bullet; approved 9 April 1914; obsolete 1914. .455 Webley Cordite Mark VI (11.5 × 19.3mm) with a 14.25-gram bullet; approved 18 September 1939. .455 Webley Auto Pistol (11.5 × 23.5 SR) with a 14.52-gram bullet; originated 1904; approved 4 April 1912; obsolete 1935–1947. (*Labbett*)**



NOMEN

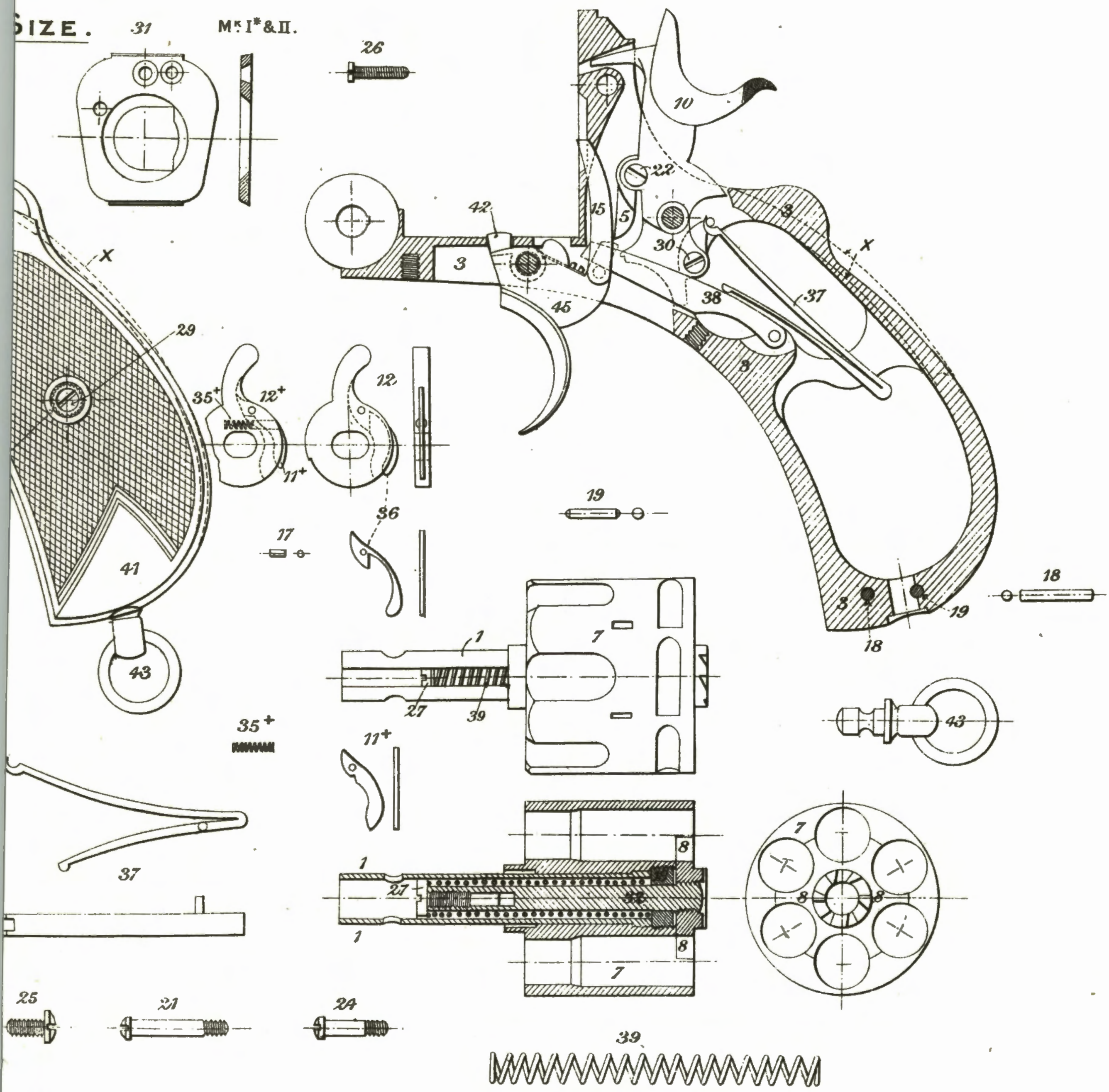
1	Axis, cylinder.	13	Nut, anti-friction.
2	Barrel ("a", front sight.)	14	" screw, stock.
3	Body.	15	Pawl.
4	Catch, barrel.	16	Pin, joint, axis.
5	" hammer.	17	" extractor lever.
6	Cup, countersunk for screw.	18	" stock.
7	Cylinder, assembled.	19	" swivel, butt.
8	Extractor.	20	Screw, axis, cylinder.
9	Guard, Trigger	21	" catch barrel.
10	Hammer.	22	" " hammer.
11+	Lever, auxiliary.	23	" guard, trigger (2)
12	" extractor.	24	" hammer or trigger

+ Components mark
x Dotted lines ... ,, ...

FIGURE 2–50. Armorer's chart comparing the Webley Mark I, Mark I*, and Mark II cordite breech-loading revolvers. Dotted outline illustrates the difference between the Mark I and Mark II grips. (*Instructions, 1912*)

*&II, |C|. B.L. REVOLVER.

PARTS.



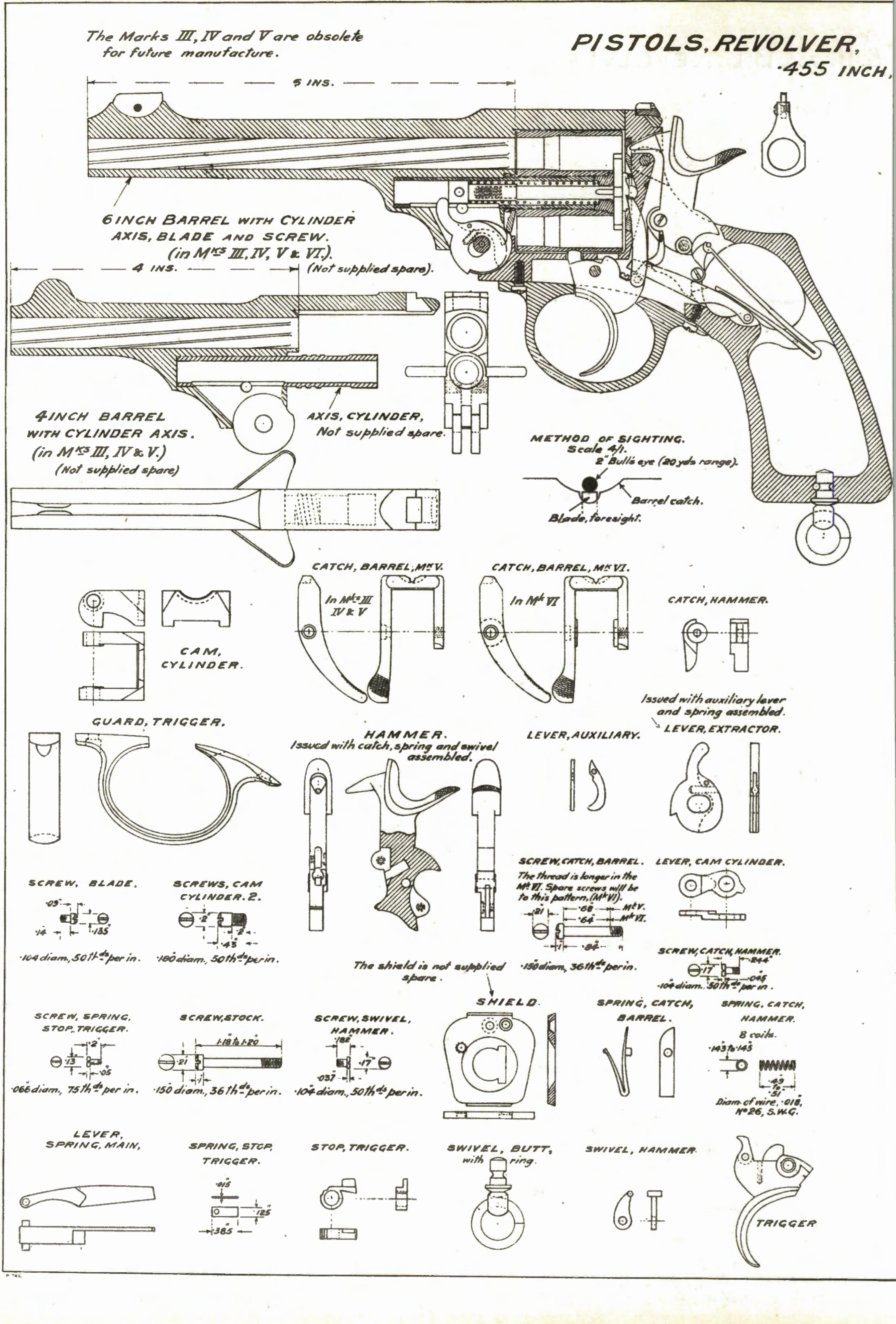
CLATURE.

25	Screw, pin, joint axis.	37	Spring, main.
26	,, shield.	38	,, ,, auxiliary.
27	,, spindle.	39	,, spindle, extractor.
28	,, spring, stop, trigger.	40	,, stop, trigger.
29	,, stock.	41	Stock, sides, left and right.
30	,, swivel, hammer.	42	Stop, trigger.
31	Shield.	43	Swivel, butt.
32	Spindle, extractor.	44	,, hammer.
33	Spring, catch, barrel.	45	Trigger.
34	,, ,, hammer.		
35+	,, lever, auxiliary.		
36	,, ,, extractor.		

thus are special to Mark II.

- - ,, - - show form of Mark II.

I. S. A.
ENFIELD LOCK



The Marks III, IV and V are obsolete for future manufacture.
PISTOLS, REVOLVER, ·455 INCH,
5 INS.
6 INCH BARREL WITH CYLINDER AXIS, BLADE AND SCREW. (in Mks III, IV, V & VI.)
4 INS.
(Not supplied spare).
4 INCH BARREL WITH CYLINDER AXIS. (in Mks III, IV & V.) (Not supplied spare)
AXIS, CYLINDER, Not supplied spare.
METHOD OF SIGHTING. Scale 4/1.
2" Bull's eye (20 yds range).
Barrel catch.
Blade, foresight.
CATCH, BARREL, Mk V.
In Mks III IV & V
CATCH, BARREL, Mk VI.
In Mk VI
CATCH, HAMMER.
CAM, CYLINDER.
GUARD, TRIGGER.
HAMMER. Issued with catch, spring and swivel assembled.
LEVER, AUXILIARY.
Issued with auxiliary lever and spring assembled.
LEVER, EXTRACTOR.
SCREW, BLADE.
·104 diam, 50th ds per in.
SCREWS, CAM CYLINDER. 2.
·180 diam., 50th ds per in.
SCREW, CATCH, BARREL.
The thread is longer in the Mk VI. Spare screws will be to this pattern. (Mk VI).
·150 diam, 36th ds per in.
LEVER, CAM CYLINDER.
SCREW, CATCH, HAMMER.
·104 diam. 50th ds per in.
The shield is not supplied spare.
SHIELD.
SCREW, SPRING, STOP, TRIGGER.
·066 diam., 75th ds per in.
SCREW, STOCK.
1·18 to 1·20
·150 diam., 36th ds per in.
SCREW, SWIVEL, HAMMER.
·104 diam., 50th ds per in.
SPRING, CATCH, BARREL.
SPRING, CATCH, HAMMER.
8 coils.
·143 to ·145
Diam. of wire, ·018, No 26, S.W.G.
LEVER, SPRING, MAIN.
SPRING, STOP, TRIGGER.
STOP, TRIGGER.
SWIVEL, BUTT, with ring.
SWIVEL, HAMMER.
TRIGGER

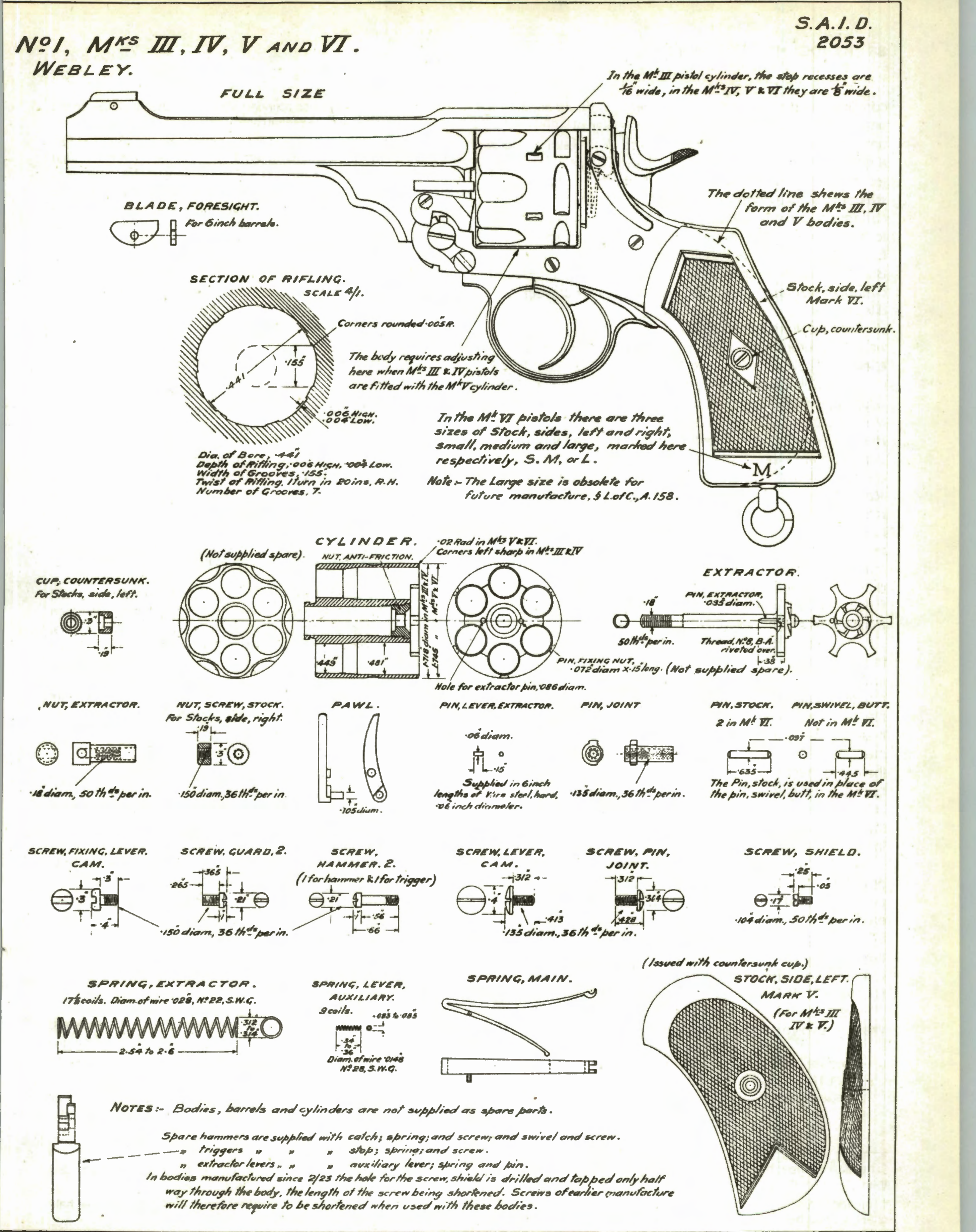


FIGURE 2–51. Armorer's chart illustrating the differences in the Webley Mark III, Mark IV, Mark V, and Mark VI revolvers. The Mark VI was unique because of its 152-millimeter barrel and square butt. (*Instructions, 1931*)

conditions under which the Webley was used. Its continued employment, culminating with the Boer War of 1899–1902, proved that the choice inspired by Lord Wolseley had been a good one for the British armed forces. The caliber chosen for the Webley was .455 (11.5mm) and the cartridge case was similar in external dimensions to the Mark III Enfield cartridge, but the bullet shape was different. It was put back to the original 11.5-millimeter diameter of the Mark I and II Enfield, making the ammunition also suitable for the older British revolvers. Originally black-powder-loaded, the Webley cartridges began to be loaded with smokeless powder (cordite) in 1894.

After the introduction of the Cordite Mark I cartridge, it was discovered that a shorter cartridge case would be beneficial. In 1897, therefore, the Mark II cartridge with a length of 19.3 millimeters (reduced from 21.7 millimeters) was adopted, with all later ammunition retaining this length.* The Mark II cartridge had a 17.2-gram lead bullet similar to the Powder Mark I and the Cordite Mark I, but the Mark III had a 14.12-gram man-stopper bullet with a deep nose cavity, and it weighed 14.25 grams. The Mark V was similar to the Mark IV in bullet shape, but the lead alloy bullet had antimony rather than tin as its minor constituent. Finally, the Mark VI had a jacketed bullet weighing 17.2 grams, similar in contour to the Mark II. The Mark VI was introduced in the 1930s for fear that lead bullets without jackets would be classified as dumdums. Cordite was used as the propellant for all cartridges, but in addition some Mark VIs were loaded with nitrocellulose and called Mark VI.Z.

The first of the British government Webleys, the Mark I, had a 102-millimeter barrel and weighed 990 grams. In general shape, it was not significantly different from other military models made by that company. The mechanism of the lock had been reduced to five main components—hammer, lifter, mainspring auxiliary, mainspring, and trigger. A notable element of this lock was the use of the mainspring to operate the entire mechanism, thereby eliminating five previously required parts, all of which had been small and difficult to machine and to assemble. In a departure from tradition, a synthetic material, black Vulcanite, was substituted for wood as the grip material.

Another unique feature of later Mark I revolvers was the detachable shield at the breech end of the frame. Early experience with the Mark I indicated that the firing pin hole eroded over time. This was corrected in the Mark II model by including a detachable shield. Remodeled Mark Is with the shield were called the Mark I*.†Within the general Mark I designation, there are revolvers of three calibers—.442 (11.22mm), .455 (11.5mm), and .476 (12.1mm).

In addition to the Mark I, the basic military models of the Webley revolvers include the following:

*Revolver, Webley, .455-inch, cordite, Mark I**. Adopted October 1894. Upon repair or refurbishing Mark Is, a hardened steel plate was added to the standing breech to make it similar to the Mark II. The pistol grip was rounded off, and the thumb pieces on the stirrup lock were made smaller.

Revolver, Webley, .455-inch, cordite, Mark II. Adopted October 1894. This model differed from the Mark I as follows: (1) a hardened steel plate was used on the breech to lessen erosion; (2) the hammer was strengthened; (3) the grip was more rounded; (4) slight changes were made in the extractor components; (5) the hammer catch spring was spiral instead of v-shaped; and (6) the stirrup lock thumb pieces were smaller.

Revolver, Webley, .455-inch, cordite Mark III. Adopted October 1897. This pistol is basically the same as the Mark II, but the attachment of cylinder to frame was improved and a cam was fitted to unlock the cylinder for removal. In 1905, a number of these were fitted with 152-millimeter barrels to meet the requirements of officers and cadets.

Revolver, Webley, .455-inch, cordite, Mark IV. Adopted July 1899. The Mark IV differed from the III in that the steel was of a different type; the trigger stop was raised and the slots in the cylinder made wider, the ratchet teeth of the extractor were case-hardened and the hammer lightened. As in the case of the III, in 1905 a quantity was produced with the 152-millimeter barrel.

Revolver, Webley, .455-inch, cordite, Mark V. Adopted December 1913. This had a larger diameter cylinder than the Mark IV. Fitted as standard with a 102-millimeter barrel, the weapon weighed 1,006 grams.

*Revolver, Webley, .455-inch, cordite, Mark I***. Adopted April 1915. Intended for naval service, this is the conversion on repair of the Mark I or I* fitted with a Mark IV barrel and a Mark V cylinder.

*Revolver, Webley, .455-inch, cordite, Mark II**. Adopted April 1915. Not an officially approved nomenclature, this designation was applied to Mark IIs that were fitted with Mark IV hammers. The star was stamped erroneously after the number on the barrel strap.

*Revolver, Webley, .455-inch, cordite, Mark II***. Adopted April 1915. Similar to the Mark I**, this is a conversion of the Mark II fitted with a Mark IV barrel and Mark V cylinder.

*Revolver, Webley, .455-inch, cordite, 6-inch barrel, Mark I***. Adopted June 1915. This was a wartime naval model in which the basic Mark I or I* pistol was fitted with the 152-millimeter barrel (i.e., the one used on the Mark IV and V) and a Mark V cylinder.

*Revolver, Webley, .455-inch, cordite, 6-inch barrel Mark II***. Adopted June 1915. This pistol was the Mark II fitted with the 152-millimeter barrel and Mark V cylinder.

Revolver, Webley, .455-inch, cordite, 6-inch barrel Mark V. Adopted May 1915. Identical to the Mark V but with a 152-millimeter barrel and a removable front sight. It weighed 1,063 grams.

Revolver, Webley, .455-inch, cordite, 6-inch barrel Mark VI. Adopted May 1915. It most obviously differs from the above by having a more square-shaped pistol grip. Internally, a number of components were redesigned to speed production.

In 1897, P. Webley & Son joined two other arms makers, W. & C. Scott & Sons and Richard Ellis & Son, in forming a public stock company called Webley & Scott Revolver & Arms Company Limited of Birmingham and London. On the board of directors were Lord Ebury, chairman; John Rigby, former

*The Mark number refers to the cartridge, not just the case. In marks subsequent to Mark II, the number refers to changes made to the bullet; the case stays the same length.

†The addition of stars to model designations has been called a "peculiarly British habit," created to indicate that minor changes, so-called half-changes, had been made to a standard model. It is especially confusing when there are multiple stars.

FIGURE 2–52. **The British Webley Government Model service revolver.** ***Top,*** **Mark I revolver in .442 caliber, introduced in 1887.** ***Middle,*** **Mark III revolver in .455 caliber introduced in 1897.** ***Bottom,*** **Mark VI revolver in .455 caliber introduced in 1915. Note the variations in grip shape. (*Hogg, Tokoi, Hogg*)**

superintendent of the Royal Small Arms Factory, 1887–1895; Colonel O. E. Macdonald; E. Ludlow; Thomas William Webley, managing director; and Frank T. Murray, secretary. The three firms continued to operate separately as they had previously. In 1906, the firm changed its name to Messrs. Webley & Scott Ltd., the name it continues to use today.

The quantity of Webley revolvers manufactured for the British government is something of a mystery. The initial order was for 10,000 Mark I revolvers. Mark I production continued until 1894; with the highest known serial number in the 39,000 range. Mark II (1894–1897) revolvers continued the sequence of serial numbers begun for the Mark I and fall in the 41,000 to 61,000 range. Mark III (1897–1899) serial numbers began at 1 and reached 10,000. Mark IV (1899–1913) serial numbers begin at about 10,000 and run to 127,000 and beyond, and Mark Vs (1913–1915) were numbered from about 130,000 to 152,000. Serial number ranges for the Mark VI revolver adopted in May 1915 have been noted from 153,000 to 400,000. In the spring of 1915, the government placed an open order for approximately 2,500 Mark VI revolvers per week, about 130,000 per year. More than 300,000 Mark VIs were produced before this contract was scaled down. Manufacture of the Mark VI at a much slower rate continued until 1928 when it was replaced by the .380 caliber (9.7mm) Enfield revolver (chapter 13). Between 1921 and 1926, the Mark VI was also manufactured at Enfield with the total produced believed to be nearly 9,000. The aggregate total for Webley military revolver production of all models is probably half a million.

In 1900, Webley & Scott had 600 employees building 100 revolvers per day. Six years later, the firm was manufacturing nearly 360 revolvers each day. By way of comparison, Smith & Wesson was turning out 725 Model 1917 .45 caliber (11.43mm) revolvers per day in 1918, and Colt was producing about 375 Model 1917s. The combined Smith & Wesson and Colt revolver production in October 1918 was 33,400 revolvers. Colt also managed to produce an incredible number of .45 caliber Model 1911 automatic pistols during this period—318,000 in 1918, or a daily average of 2,290 self-loading pistols. These figures begin to indicate the scope of handgun mass production during the First World War.[32]

European Revolvers, 1870 to 1900

The revolvers used by the armies of Europe, as indicated in table 2–1, represented quite a mixture. Briefly, the history of continental military revolvers is summarized country by country in the following narrative. Table 2–7 compares the military strength of Europe's armies from 1892 to 1894, from which their respective needs for handguns can be understood.[33]

AUSTRO-HUNGARIAN EMPIRE The first Austro-Hungarian center-fire military revolver came from the workshops of Leopold Gasser (1836–1871). When he moved to Vienna in 1858, he was already a journeyman gunsmith. Gasser became a master craftsman in 1862 and manufactured revolvers on the Beaumont-Adams pattern under the company name Leopold Gasser K.u.K. Hof-und Armee-Waffenfabrik. He created an 11.43mm military revolver in 1869 that used the Lefaucheux double-action lock mechanism. This revolver was tested and adopted by the Austro-Hungarian Army. Gasser's pistol is noteworthy because it was an unusually large and heavy weapon and because it fired the relatively powerful 11.25 × 36mm Werndl Model 1867 carbine cartridge. Its bullet weighed 19.4 grams, with a muzzle velocity of about 213 meters per second and a muzzle energy of about 440 joules.

The Model 1870 Gasser revolver was issued to noncommissioned officers in the combat services. A Model 1870–74 revolver differed from the original only in the use of crucible cast steel for the frame rather than iron. In 1882, the Austro-Hungarian army introduced a shorter 11.25mm pistol cartridge for a slightly improved version of the Gasser revolver in an effort to prevent accidents of the type that occurred from firing carbine-power cartridges in the revolver.

Gasser's 1870, 1870–74, and 1882 revolvers were usually marked *L. Gasser, Wien, Patent, Ottakring,* with *Ottakring* denoting the location of one of his factories. These Gasser handguns had a wedge that helped hold the barrel to the cylinder pin as in older Colt revolvers. Gasser also relied on a screw at the front of the lower frame. In 1878, Captain Alfred Kropatschek (1838–1911), who was instrumental in

TABLE 2-7 MILITARY MANPOWER, 1892–1894

	Population (in millions)	*Peacetime Army Strength*	*Army as Mobilized for War*	*Resources of Able-bodied Men (in millions)*
Austria-Hungary	42.83	309,187	2,109,731	9.80
Belgium	6.03	96,300	250,706	1.46
Denmark	2.17	36,358	114,408	0.49
England	38.61	140,968	1,179,626	12.00
France	38.34	570,000	4,745,457	9.55
Germany	49.42	513,983	2,977,629	12.00
Holland	4.45	90,750	183,450	1.05
Italy	29.70	309,187	2,556,252	7.50
Russia	108.78	840,000	7,812,792	22.00
Spain	17.60	136,588	1,135,196	4.20
Sweden & Norway	6.77	18,000	282,140	1.60
Switzerland	2.93	127,000*	479,396	0.72
Turkey	33.56	185,000	960,464	N/A
United States	62.62	28,265	150,000	9.14

*No standing army; ready militia only.

TABLE 2-8 COMPARISON OF AUSTRIAN AND CONTEMPORARY REVOLVERS

	1870 Gasser	*1878 Gasser-Kropatschek*	*1872 Colt*	*Enfield 1880 Mark I*
Caliber	**11.25 × 36**	**9 × 26**	**11.43 × 32.1**	**11.5 × 21.7**
Overall length (mm)	**375**	**229**	**318**	**292**
Weight (grams)	**1,520**	**770**	**1,048**	**1,148**
Barrel length (mm)	**235**	**122**	**191**	**149**

getting Gasser's first revolver tested by the army, and Johann Gasser, Leopold's younger brother, created a small 9mm version of the Model 1870 Gasser, which was also adopted by the Austro-Hungarians as the Gasser-Kropatschek *Infanterieoffizersrevolver.* As the name implies, it was issued to infantry officers and the gendarmerie. By 1884, Gasser's factory was producing 100,000 military revolvers a year with a combination of manpower, 250 workers, and machine power, with interchangeability of parts virtually nonexistent.

The last revolver adopted by the Austro-Hungarian armed forces was the Model 1898 Rast & Gasser, designed by August Rast and fabricated by the Waffenfabrik Leopold Gasser. This eight-shot, gate-loaded, solid-frame, rod-ejecting Schmidt-Galand double-action revolver fired an 8 × 27mm cartridge. Issued to officers and noncommissioned officers, these somewhat awkward-looking weapons were extremely well-made. They had an improved loading gate safety; when the gate was open the hammer could not be cocked. Based on the Portuguese *Abadie* safety, this device disconnected the trigger from the hammer and kept the hammer in a locked position. The 8mm Rast & Gasser revolvers lacked the knock-down power of the earlier 11mm Model 1870 Gassers. In addition to being smaller in diameter, the 8mm projectile was made of hardened (alloy) lead, with a muzzle velocity of about 229 meters per second. As a result, the smokeless powder-propelled* bullet penetrated targets instead of knocking them down. Nevertheless, the switch to 8mm projectiles by the Austro-Hungarians was typical of the late nineteenth century trend to small caliber handgun cartridges.

When the Austro-Hungarian armed forces disposed of their Model 1870 Gassers, most were sold to the kingdom of Montenegro, which had become a sovereign state following the Russo-Turkish War of 1877–1878. This Balkan monarchy subsequently became an important market for these and similar pattern 11mm revolvers. This market blossomed when King Nicholas (reign 1910–1918) decreed that all male subjects purchase a Montenegrin-style revolver causing a flood of weapons in both solid and hinged frames from Gasser's two factories and a number of Belgian manufacturers. Most Montenegrin-type revolvers had coarsely-chiseled engraving, bone, or mother-of-pearl grips, and often nickel- or silver-plating. Although unimportant from a design point of view,

*Jagd-und Schiessenpulver No. 2

FIGURE 2–53. The Austro-Hungarian 11mm Model 1870 Gasser revolver. (*Tokol*)

FIGURE 2–54. The Austro-Hungarian 8mm Model 1898 Rast & Gasser revolver, serial number 23,217. (*Aberdeen*)

these handguns are significant because they saw military use in the Balkans for many years and because they were produced in such large numbers. Accompanying illustrations (fig. 2–54, 2–55, 2–56, 2–57, and 2–58) are typical of the Montenegrin revolver.

BELGIUM This relatively small kingdom assumed disproportionate importance in the small arms world because of the large arms manufacturing center at Liège. As Claude Gaier describes so clearly in *Four Centuries of Liège Gunmaking,* the manufacture of firearms in Belgium had literally grown from a cottage industry, where guns or their components were made in the homes of the workers, to a factory-based production system.[34] In the last three decades of the nineteenth century, there was still a mixture of cottage and factory industry. Many of the factory-based manufacturers still subcontracted for parts from individuals who worked in their homes. The products of Liège ranged from extremely cheap handguns—in terms of both price and quality—to models of the highest quality. In 1904, the Liège industry produced 549,669 handguns (revolvers and self-loading pistols); in 1905 the figure was 629,376. Readers interested in this history should consult Gaier's study noted above and Taylerson's book *The Revolver* and Boothroyd's *The Handgun.*

The first center-fire revolver adopted by the Belgian armed forces was the Model 1871 Chamelot-Delvigne-type in 10.4mm. This handgun was replaced in 1878 by one designed by two brothers from Liège. Emile and Léon Nagant are of premier importance to handgun history yet relatively little is known about them. They created a military revolver that has been widely used. Patents on their basic handgun date from 1879 in Britain (patent 4,310) and 1880 in the United States (patent 226,923). Their revolver was of solid-frame construction with a sliding-rod ejection system and a lock mechanism that could be removed without tools. The lock was mounted in the frame, which also formed the right side of the grip. The left side was enclosed with a removable sideplate. Unique to their revolver and protected by a patent was the means of relieving the tension of the mainspring. In the Chamelot-Delvigne lock, a lever cam was provided to relieve the tension; Galand's lock utilized a thumb screw for the same purpose. But the Nagants accomplished the same effect by hinging downward the trigger guard.

The revolver illustrated in the Nagants' British patent application was the Belgian Model 1878, which was chambered to fire the 9 × 22mm center-fire cartridge. A double-action pistol, this weapon was adopted for use by the officer corps. In 1883, a single-action model with a nonfluted cylinder was approved for use by the army's mounted noncommissioned officers and its trumpeters. This model is worth noting only

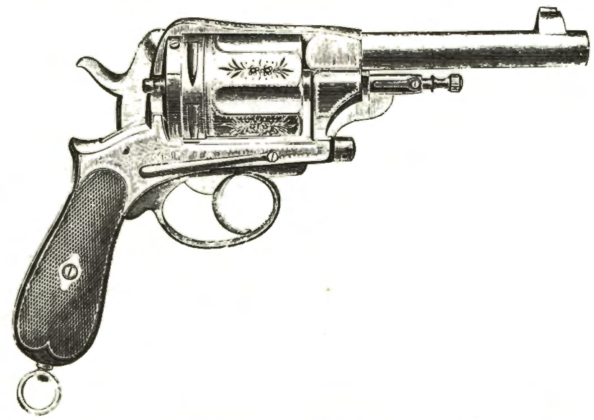


FIGURE 2–55. Montenegrin Armée Revolver, as manufactured by the Manufacture Liégeoise d'Armes a Feu, in 9mm and 11mm. (*Manufacture Liégeoise*)

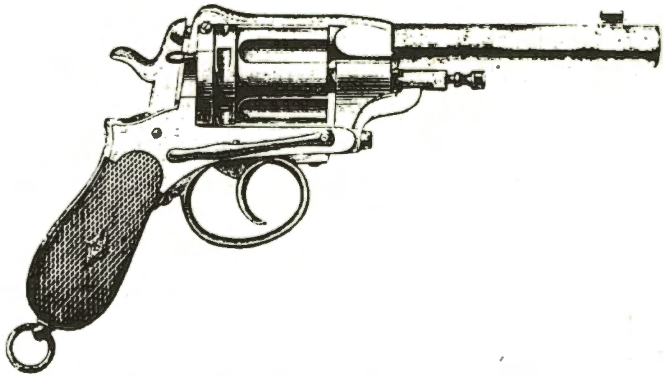


FIGURE 2–56. Montenegrin Revolver, as manufactured by J. B. Rongé Fils, Liège. (*J. B. Rongé*)

FIGURE 2–57. A Gasser hinged-frame 11mm Montenegrin-type revolver. (*Hogg & Weeks*)

FIGURE 2–58. A Gasser 11mm Montenegrin-type revolver with the action open to show the extractor system. (*Hogg & Weeks*)

FIGURE 2–59. The Belgian 10.4mm Chamelot-Delvigne military revolver. (*Tokoi-Tøjusmuseet*)

because the hammer rebounds slightly after the revolver has been fired. The 9mm Model 1878–86 double-action Nagant revolver had this hammer rebound aspect because of the elimination of five parts—sear, sear spring, trigger spring, pawl spring, and mainspring stirrup. The mainspring served as both the trigger and the pawl spring, following the pattern of the Model 1883. Revolvers similar to the Nagant were adopted by the Brazilian and Argentine armies, while Norway adopted the 9mm version in 1883. Sweden began to use a 7.5 × 22.6mm model in 1887, and Norway followed in 1893. The best-known Nagant revolver was their "gas-seal" model, described in the section on Russian handguns.

DENMARK The Danish army in 1865 adopted an 11mm Lefaucheux-Francotte pin-fire revolver with a solid frame and rod ejector. These Model 1865 revolvers were converted to 11.45mm center-fire at the end of the century by the Kronberg Gevaerfabrik and redesignated the Model 1865/97. In 1880, the Gevaerfabrik manufactured several hundred 9mm double-action revolvers with a Schmidt-Galand-type lock mechanism.

During the same era, the Danish navy adopted two different pistol models. The first, the Model 1871, was a pin-fire revolver of the Gasser-Kropatschek pattern. In 1881, the A. Francotte handguns were converted to 11mm center-fire by the navy yard in Copenhagen. As converted, these revolvers were called the Model 1871–1881. A Model 1891 Naval revolver in 9mm was also used by the Danes. Manufacture of these revolvers has been attributed to both J. B. Rongs Fils of Liège and to Francotte of the same city. Generally patterned after the Belgian handgun called the *Le Vaux,* the Danish Naval model has a half-round and half-octagonal barrel and a lever safety. Revolvers were issued to all officers in combat units, cavalry noncommissioned officers and trumpeters, and artillery noncommissioned officers. Noncommissioned officers in the cavalry and artillery were also armed with sabers. After 1910, this wide variety of revolvers was replaced by the 9mm Bergmann self-loading pistol.

FRANCE As several authorities have pointed out, the French army leadership was opposed to the issuance of revolvers to its troops. Generally, handguns were adopted only as personal defense weapons, not as offensive weapons for combat. The French persisted in the faith in the *arme blanche,* saber, longer than even the most conservative officers in other European armies. It was, as was previously noted, the French navy that introduced the Lefaucheux pin-fire revolver. The army adopted its own double-action, solid-frame, center-fire revolver in 1873. The 11mm Modèle 1873 was intended for issue to noncommissioned officers, while the fluted-chamber 11mm Modèle 1874 was issued to officers. Essentially a variant of the Chamelot-Delvigne lock mechanism, these revolvers were very serviceable and very heavy duty. These indestructible handguns were made at the Manufacture d'Armes, Saint-Étienne.

In 1885, the French military examined another 11mm revolver, but it was not adopted. Instead, the army committee studying the question of a new service handgun turned their attention to the so-called Modèle 1887, a very close copy of the Swiss Modell 1882 described later. As in several other

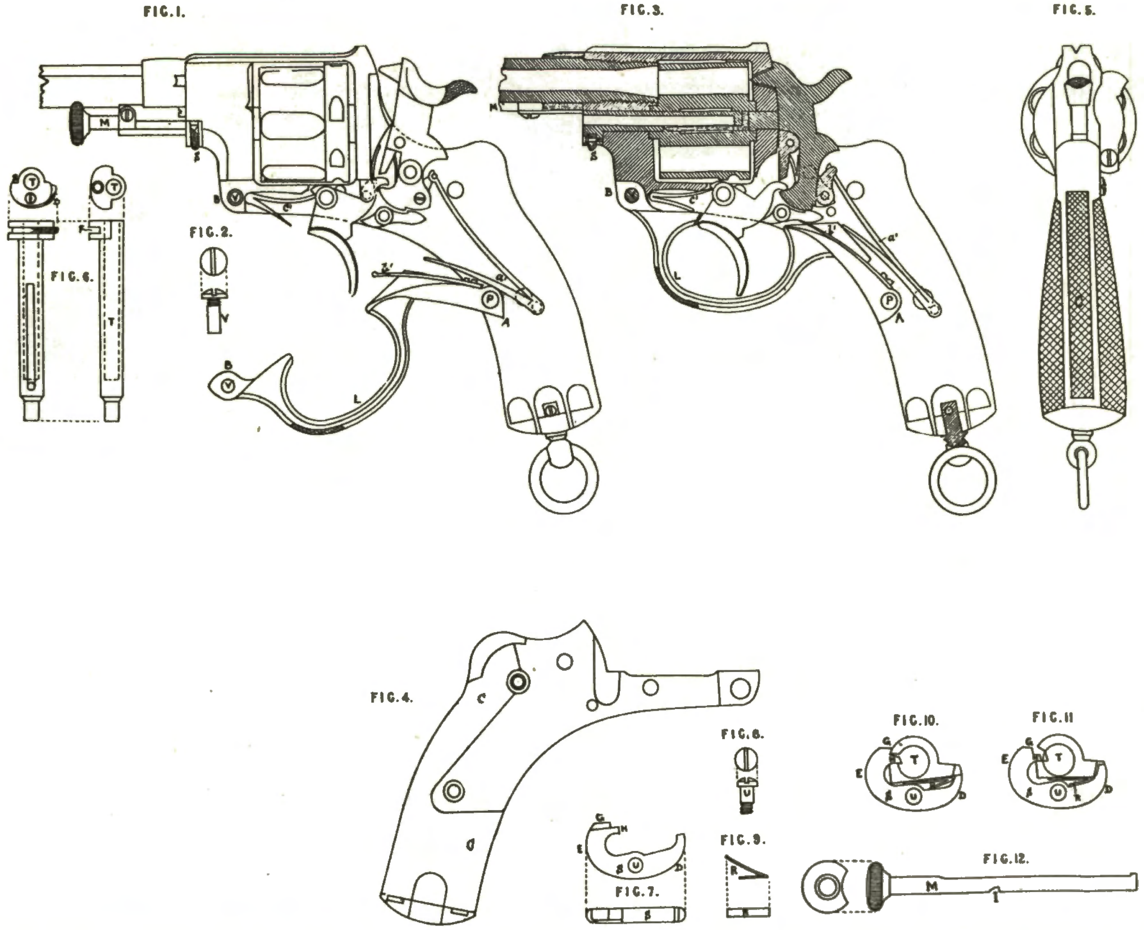


FIGURE 2–60. Emile Nagant's British patent number 4,310 of 1879 protected the use of the downward-hinging trigger guard, which relieved the tension on the mainspring. (*British Patent*)

FIGURE 2–61. The Belgian 9mm Model 1878 Nagant officer's revolver. (*Hogg & Weeks*)

FIGURE 2–62. The Belgian 9mm Model 1883 Nagant noncommissioned officer's revolver. (*Hogg & Weeks*)

FIGURE 2–63. The Danish 11.45mm Centraltaending Model 1865/97, which fired the 11mm pin-fire-type ammunition. (*Tokol-Tøjhusmuseet*)

FIGURE 2–64. The Danish 9mm Model 1880 officer's revolver. The specimen illustrated here is the sealed pattern preserved at the Tøjhusmuseet in Copenhagen. (*Tokoi-Tøjhusmuseet*)

countries at this time, the Army Committee of France had decided that a smaller caliber revolver was desirable. The French chambered the Modèle 1887 for an 8mm cartridge and manufactured about 1,000 of them for testing. After several modifications and refinements, the new revolver was christened the *Modèle d'Ordonnance 1892.* This solid-frame, double-action, six-shot, side-swinging revolver was the product of the army committee and not, as far as anyone can determine, the work of Lieutenant Colonel Nicholas Lebel after whom the revolver is often named. The Modèle 1892 fired the 8 × 27mm center-fire cartridge.

Although the Modèle 1892 was similar in concept to the Colt and Smith & Wesson swing-out cylinder revolvers, the French handgun was unique because its cylinder swung out to the right instead of to the left. It was unlocked by means of a lever, which rotated to the rear, unlatched the cylinder, and disconnected the trigger from the hammer (after the fashion of the Abadie system).* As figure 2–69 shows, the entire left side of the revolver could be hinged open for field maintenance and cleaning. Opening the side plate revealed a double-action lock mechanism that was very similar in concept to that of the Modello 1889 Italian service revolver. It is estimated that approximately 176,000 Modèle 1892 revolvers were manufactured between 1892 and 1900.[35] Exact numbers are difficult to determine because of the varied serial numbers used by the French, some with letter prefixes, the importance of which has yet to be explained.

While most handgun authorities agree that the Modèle 1892 was an excellent revolver from a manufacturing point of view, they also agree that it fired a totally inadequate cartridge. The 7.8-gram projectile had a muzzle velocity of about 220 meters per second, a combination producing only about 159 joules. Even when French troops adopted self-loading pistols, they continued to use low-power cartridges, indicating perhaps that they did not consider such weapons very important.

*Abadie was an obscure Belgian gunsmith who held a Belgian patent on a revolver mechanism of this type.

FIGURE 2–65. The French 11mm Modele 1873 noncommissioned officer's revolver. These handguns were unique because they were issued in the plain steel without any protective finish. (*Aberdeen*)

FIGURE 2–66. The French 11mm Modele 1874 *Revolver d'Officier*. These pistols had a protective blued finish. (*Hogg & Weeks*)

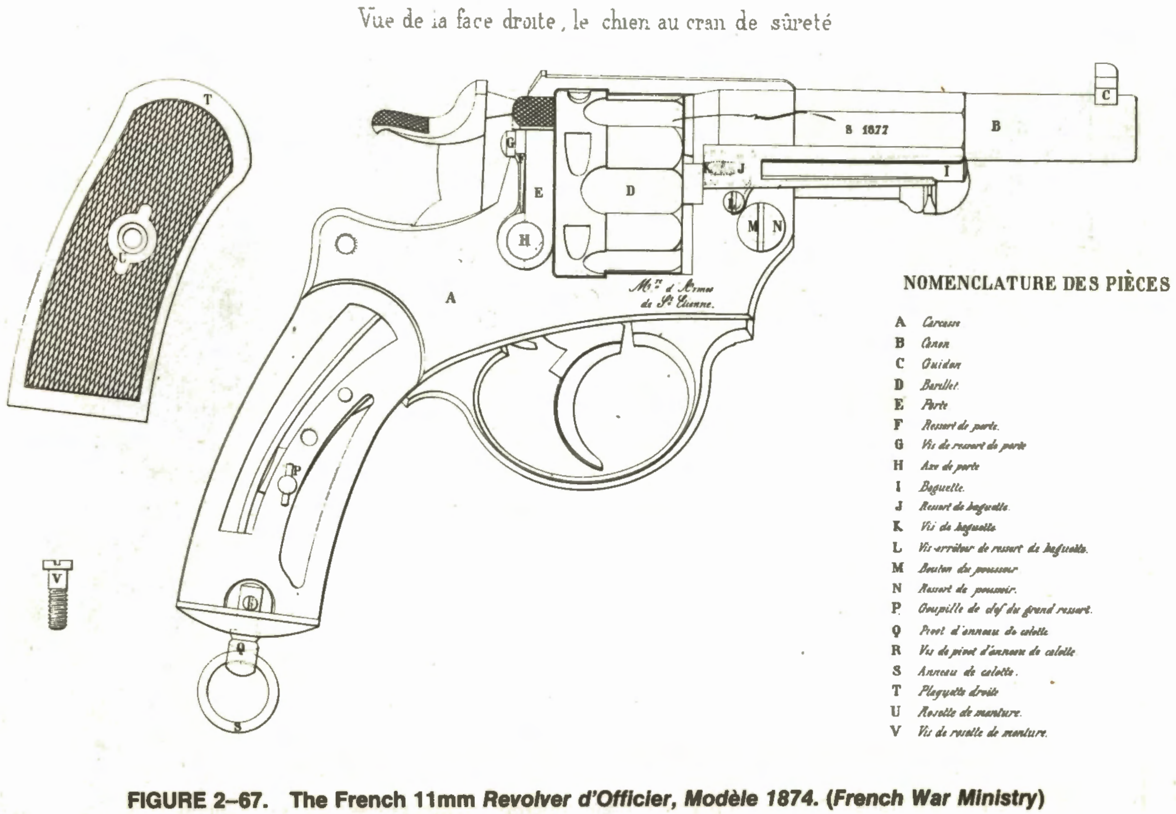


FIGURE 2–67. The French 11mm *Revolver d'Officier, Modèle 1874*. (French War Ministry)

FIGURE 2–68. The French 8mm *Modèle d'Ordonnance 1892* service revolver. (*Hogg & Weeks*)

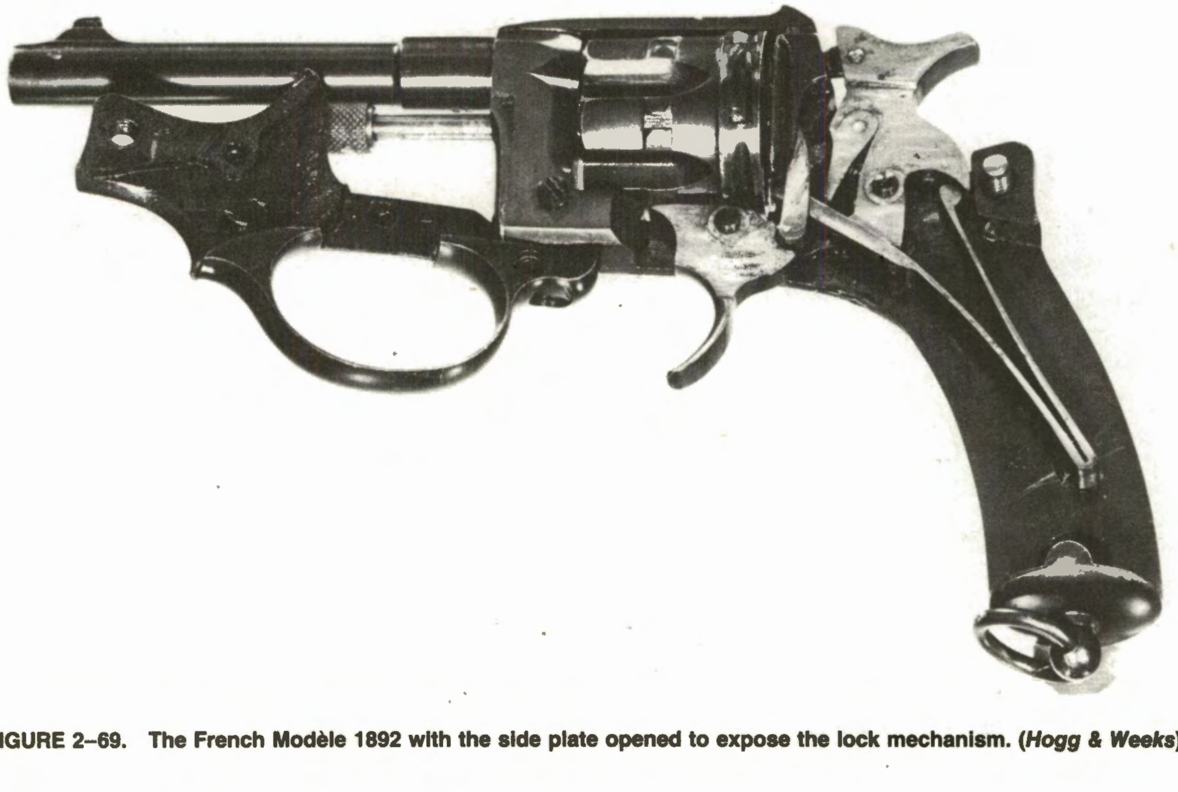


FIGURE 2–69. The French Modèle 1892 with the side plate opened to expose the lock mechanism. (*Hogg & Weeks*)

GERMANY The military handguns adopted by the Berlin government in the 1870s are distinguished by their unimportance. Although the German small arms designers would subsequently be a major source of innovation in the field of self-loaders, their contributions to revolver design were singularly negligible. Undoubtedly, this can be attributed to the Germans' consideration of the handgun as a second-class weapon. The *Reichsrevolver,* designed to the specifications of a small arms commission was a revolver of little merit but considerable durability.

In the years following the consolidation of the German Reich (1871), the authorities of the new state were faced with the rationalization of the armed forces of the former principalities of Prussia, Saxony, and Württemberg. Rationalization included the creation of standard uniforms, accoutrements, and weapons. In the case of small arms, the adoption of the Mauser lead to a frightful expenditure of ammunition. Looking back from the vantage point of a hundred years, they were, in part, correct. The magazine-fed, repeating, breech-loading rifle and the multishot revolver were the vanguard of a number of weapons that increased the firepower of the infantry by significantly increasing the number of cartridges fired in combat. From a logistical standpoint, such ammunition usage was disconcerting. From a fiscal viewpoint, there was also cause for alarm. As the First World War taught European and American military planners, the battle often went to the side that could bring the most firepower to bear upon a small piece of real estate. A corollary argument was that wars would be won by the side that had the economic-industrial strength to permit it to expend the most ammunition. But war was far in the future. Nineteenth century German military personnel were drawing upon their experiences in the Seven Weeks War with Austria (1866) and the Franco-Prussian War (1870–1871) when they adopted the Reichsrevolver. The Germans anticipated that future wars would be quickly fought conflicts.

The German revolver commission didn't understand the necessity of quick reloading. In all of their attempts to make handguns easier to reload, the inventors were missing the point. Ian Hogg in his book *German Pistols and Revolvers* has addressed this point: "It may well have been that the Commission subscribed to the contemporary theory that it was the duty of officers and NCOs to supervise the activity of soldiers and not to get themselves embroiled in personal combat. Therefore, since the revolver would only be used for one or two desperate shots when things got out of hand, rapid reloading was a luxury they could do without."[36] According to this line of thinking, an officer who found himself in a situation that required firing more than six shots was probably in severe jeopardy already and a handgun would likely not save him. The Modell 1879 was first and foremost a backup weapon to the saber for the cavalry, and six shots were probably sufficient for a man on horseback fighting a lightning cavalry assault, who could not reload his weapon on a galloping horse. Perhaps the conservatism of the revolver commission was firmly rooted in what was viewed as practical considerations. Undoubtedly, the six shots of the Modell 1879 were a substantial improvement over the old single-shot pistols.

The Reichsrevolver was constructed around a solid frame, which included a hexagonal extension into which the barrel was screwed and heat shrunk. The cylinder was removed by rotating the latch 90 degrees downward. The latch pin, which passed through the frame, locked the cylinder pin by passing through a semicircular cut on the cylinder pin. Rotation exposed a cut on the latch pin that permitted the cylinder pin to be withdrawn. One very good feature that the commission included in this design was the recessing of the chambers

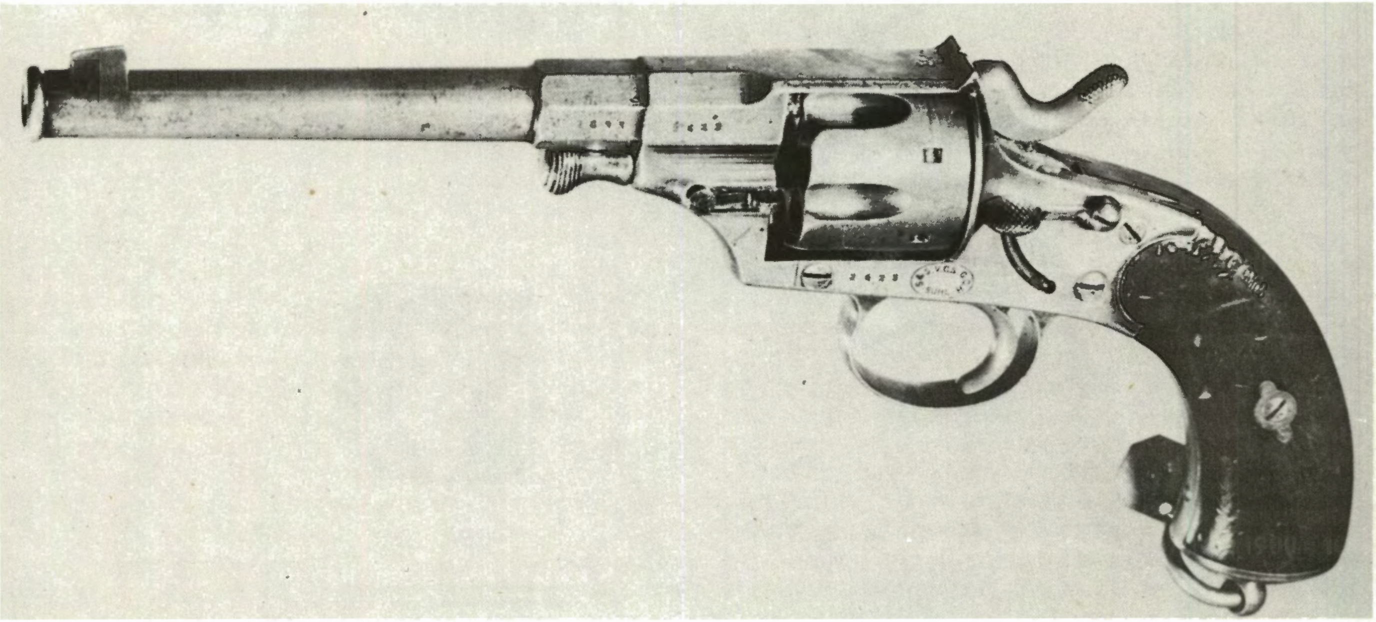


FIGURE 2–70. The German 10.5 mm Reichsrevolver Modell 1879, as manufactured by the Spangenberg & Sauer–V. Christian Schilling–C. G. Haenel consortium. (*Hogg & Weeks*)

of the cylinder so that the head of the cartridge was completely enclosed. In a day of metallurgical failures, any step taken to prevent accidents caused by the failure of the cartridge case was important. A questionable feature of this revolver was its manual safety. Mounted just below the hammer, the safety lever could be depressed to lock the action. A half-cock notch was also provided on the hammer, permitting the cylinder to revolve freely.

Although some experts contend that there was no such gun as the German Modell 1883, claimed by others to be a variant of the Modell 1879, an 1894 U.S. Army intelligence report described such a pattern.[37] The lock work of this second model of the Reichsrevolver was essentially the same as the first. Most obvious changes included a shorter barrel (57 millimeters less than the Modell 1879) and the elimination of the muzzle reinforcement. Alterations also included changing the shape of the frame forward of the cylinder and redesigning the cylinder release to simplify the mechanism and prevent parts breakage, which was common with the Modell 1879. Finally, military issue Modell 1883 revolvers had a more sharply curved butt than their predecessors. The Modell 1879 revolvers were given a rust brown surface treatment, while the 1883 had a dark blue or black color to its surface.

While no estimates of the quantities of Reichsrevolvers produced have been encountered, it can be safely assumed that large numbers were manufactured by several concerns. Gebrüder Mauser & Cie, Oberndorf am Neckar, Württemberg, founded in 1874, made Reichsrevolvers between 1880 and 1882–1883 and became Waffenfabrik Mauser AG in 1884. Since no revolvers have been reported with *Waffenfabrik Mauser* marks, apparently all of their Reichsrevolvers were made prior to 1884. Waffenfabrik von Dreyse, Sömmerda was founded by Johann Niklaus von Dreyse, inventor of the bolt-action needle rifle, in the mid-nineteenth century. Revolvers were made between about 1892 and 1894–1895 under the supervision of Franz von Dreyse, son of Johann Niklaus. Franz died in 1894, and the business steadily deteriorated and was acquired by Rheinische Metallwaaren-und Maschinenfabrik (later Rheinmetall) in 1901. V. C. Schilling & Cie, C. G. Haenel & Cie, and Spangenberg & Sauer, Suhl, a combine sometimes known as "Handfeuerwaffenfabrik-Genössenschaft, Suhl," appear to have made the Modell 1879 revolver until the mid-1880s, when Spangenberg & Sauer underwent a change in management and left the group. V. C. Schilling & Cie was acquired by Heinrich Krieghoff Waffenfabrik in 1904, but remained independent until the end of the First World War. C. G. Haenel & Cie traded independently until 1945. V. C. Schilling & Cie and C. G. Haenel & Cie, Suhl, continued operations together after Spangenberg & Sauer left and made revolvers well into the 1890s. J. P. Sauer & Sohn, Suhl, claims to have been founded in 1731, but started trading as a separate entity only when the partnership between Spangenberg and Sauer ceased, possibly on the Spangenberg's death in the mid-1880s. Sauer continued to make Reichsrevolvers into the 1890s. Operations continued in Suhl until the end of the Second World War. Königliche Gewehrfabrik, Erfurt, a Prussian government arsenal, was moved to Erfurt from Saarn bei Düsseldorf in 1862 and made 1883 revolvers after about 1890. The factory was dismantled in 1919, and the machinery distributed among various private firms and Allied nations as reparations.

In addition to the Reichsrevolvers produced for the Ger-

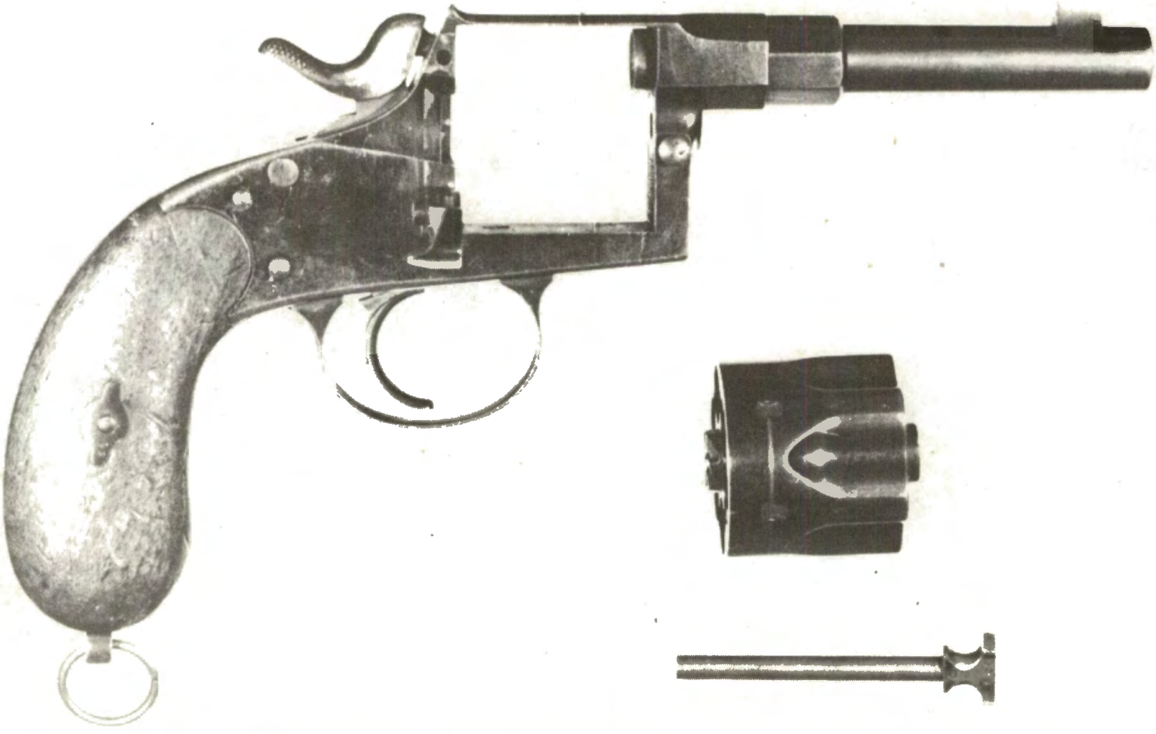


FIGURE 2–71. The German 10.55mm Reichsrevolver Modell 1883. (*Hogg & Weeks*)

FIGURE 2–72. The Dutch 9.4mm Modell 1873 Old Model service revolver. (*Smithsonian*)

man states, thousands were also manufactured for the civilian market by the same firms that held military contracts. Belgian arms makers, like Auguste Francotte, built thousands of copies, as well. Some of the military issue pistols saw combat in the German overseas colonies, and many went to the front in World War I as part of the equipment of the reserve forces. Although officially superseded and replaced by the Pistole 08 in 1909, the Modell 1879 and Modell 1883 continued to see service until 1945. Undistinguished as they were, the Reichsrevolvers survived for an incredibly long time.

FIGURE 2–73. The 10.35 Italian Modelo 1874 Chamelot-Delvigne revolver as manufactured by Real Fabbrica d' Armi Bressica in 1888. (*Hogg & Weeks*)

FIGURE 2–74. Two models of the Italian 10.35mm *Pistola a Rotazione, System Bodeo, Modello 1889. Top,* This revolver was made by N & V Castelli, Bresica, in 1922. *Middle,* Long-barreled version of the Modello 1889. *Bottom,* A model built in 1915, maker unknown. (*Hogg & Weeks*)

HOLLAND The Dutch service revolver adopted in 1873, often incorrectly called the Chamelot-Delvigne, was another handgun of questionable merit. Although definitely rugged, this 9.4mm solid-frame, six-shot, double-action, gate-loaded revolver with a variant of the 1878 Nagant lock mechanism offered little more than reliability and service life to the troops who carried it. The three basic models of the 1873 are commonly called the O.M. (Old Model), the N.M. (New Model), and the Klein (small) Model. The Klein Model was shorter and lighter than the standard 280-millimeter, 1,300-gram Old and New Models. The 1873 revolvers were also modified to be used as tear gas projectors (*Traangas*) and indoor target pistols (*Kamerschietoefening*). The target pistol fired a small caliber, 6mm, reduced-load Flobert target round. As with the German Reichsrevolver, these Dutch pistols required a separate rod, which was carried as an accessory in the military holster, to eject the cartridge cases. De Beaumont and P. Stevens of Maastricht (near Liège) and J. F. T. Bar of Delft in the Low Countries were the manufacturers for several models of the Dutch revolver.

Much less common among Dutch service pistols is the KNIL Modell 1891 revolver, which was manufactured in the Dutch East Indies (now called Indonesia) at the Pyrotechnische Werkplants, Surabaya, on the island of Java. Firing a 10mm cartridge, this solid-frame, rod-ejector, double-action, six-shot revolver had a Schmidt-Galand-type lock mechanism. Superior in several regards to the Modell 1873 series, it had a better ejection and takedown system, but was only used by Dutch East Indies Police and other colonial authorities.

ITALY Military authorities of the new kingdom of Italy, the unification of which was completed in 1870, adopted a version of the Chamelot-Delvigne revolver in 1872. Externally it was quite similar to the French Modèle 1874 officer's revolver. The Modello 1872 was a rugged, heavy handgun.

In 1884, the Italian armed forces adopted the *Pistola a Rotazione, System Bodeo, Modello 1889*. Bodeo was the chairman of the commission that oversaw the creation of the design, not the designer himself. As Hogg and Weeks note in *Pistols of the World,* it was common practice on the continent for commission members to add their names to guns designed by another, thereby "attaining immortality at someone else's expense."[38] There was hardly anything to distin-

FIGURE 2–75. Four late nineteenth century revolver cartridges. *Left to right:* 9 × 17.3mm Danish Model 1891; 10.6 × 25mm German Reichsrevolver; 11 × 17.8mm French Ordonnance Revolver; 10.4 × 20.2mm Italian Modello 1874. (*Nonte*)

TABLE 2-9 COMPARISON OF TWO ITALIAN REVOLVERS

	Modello 1872	*Modello 1889 (System Bodeo)*
Caliber	10.35	10.35
Overall length (mm)	279	235
Weight (grams)	1134	910
Barrel length (mm)	156	114

guish the Modello 1889 from other contemporary revolver designs. An Abadie-type loading gate hammer disconnector was included, plus a steel hammer block safety. Until the trigger was pulled completely to the rear, the hammer block safety interposed between the hammer and the frame, making it nearly impossible for the firing pin to strike the cartridge primer inadvertently. Italian service revolvers were manufactured by Bernadelli (Modello 1889), Castelli (Modello 1889), Metallurgica Tempini (Modello 1889), Real Fabbrica d'Armi, Glisenti (Modello 1872, 1889) in Bresica, and by Siderugica Glisenti (Modello 1872, 1889) in Turin. Production of the 1889 revolver continued throughout the 1920s, and it was still in use during World War II.

The Modello 1889 was produced in two major variations, with and without trigger guards. As of 1893, these pistols were issued to several kinds of troops. The Carbiniere, a national police in peacetime, carried the 1889 pistol with 36 cartridges and a carbine. When this force was mounted, they were also armed with sabers. In the infantry and the cavalry, pistols were issued to officers, noncommissioned officers, and trumpeters, with each man carrying 18 cartridges. All ranks in the horse artillery were issued the revolver and long sword, as were field artillery officers and noncommissioned officers. In the medical service, all officers were given the Modello 1889.[39] When the Glisenti self-loading Modello 1905 pistol was issued in 1906 to Carbiniere officers and in 1911 to other army officers, the Modello 1889 was carried by soldiers who supported the army in the field but whose primary function was not fighting. In the 1914–1918 war, all tripod and ammunition carriers in machine gun units carried this revolver, as did stretcher-bearers.

NORWAY The Norwegian Army adopted a Lefaucheux pinfire revolver in 1864 to replace the single-shot percussion arms being used by the cavalry and artillery. The Stortinget (the Norwegian parliament) allocated enough funds for the purchase of 1,500 revolvers from Lefaucheux in Paris—1,100 single-actions (*enkeltspenner*) for privates, and 200 single-actions and 200 double-actions (*selvspenner*) for officers, who could choose which type of pistol they wanted. The private's model had round barrels, while the officer's model had an octagonal barrel, although a few double-action revolvers with round barrels do exist to the confusion of specialists. In 1867, personnel at the Kongsberg Våäenfabrik began the production of 200 private's models. In 1898, some of the Model 1864 revolvers were modified to fire center-fire ammunition. A reinforcing bar was added to the top of the frame, running above the cylinder to the top of the barrel, where it was fastened with a screw. This reinforcement was similar to that in the Danish Model 1865/97 revolver. In Norway, the conversion was called the M/1864/1898.

In 1883, the decision was made to adopt the 1878 Nagant-type pistol from the Nagant factory in Liège. It was designated the *9mm Nagant Selvspenner revolver for offiserer og underoffiserer M/1883.* Although the Norwegians continued issuing single-action pistols to privates and allowing officers their choice of single- or double-action, only 794 double-actions were obtained from Nagant. Ten years later, the government acquired 12,964 double-action 7.5mm Nagant revolvers for all armed fighting personnel regardless of rank. Most of these came from the Nagant factory, with 350 having been made at the Husqvarna factory in Sweden* and a small quantity at the Kongsberg Våäenfabrik. With the exception of the Norwegian acceptance stamps, the Husqvarna-made pistols are virtually indistinguishable from the Swedish Model 1887. The Nagant revolvers would remain in service long after they were officially superseded by the Colt 1911-type automatic pistol in 1914.[40]

PORTUGAL The use of revolvers appears to have been limited in this Iberian nation. Most officers carried swords of some sort, with only mounted artillery troops using revolvers to supplement the sabers. Two revolvers were in use at the end of the nineteenth century.

TABLE 2-10 NINETEENTH CENTURY PORTUGUESE REVOLVERS

	Model 1878 Officer's Model	*Model 1886 Trooper's Model*
Caliber	9.1	9.1
Overall length (mm)	218	249
Weight (grams)	752	835
Barrel length (mm)	113	142

These solid-frame, six-shot, double-action, rod-ejector revolvers had Model 1878 Nagant lock mechanisms, and most of the surviving specimens were made in Belgium. They are worthy of attention because of the Abadie loading-gate safety. When the rearward-opening loading gate was swung open, the action moved the hammer to the half-cocked and locked position and held the hammer in such a fashion that the double-action function of the trigger could not cock it. This eliminated accidental firing double loading or unloading. The chambers were automatically aligned so that the rod ejector could be employed. *Systeme Abadie Brevete* was also used in the Austrian Modell 1898, the French Modele 1882, the Italian Modello 1889, and the Swiss 1882 Ordonnanzrevolver.[41]

SPAIN All officers in the Spanish army were expected to provide their own revolvers. In 1863, the Lefaucheux pin-fire revolver was the basic pattern carried by most officers, but they could purchase any revolver that fit the general specifications established by the army. The service revolver had to be a center-fire pistol, weighing between 850 and 1,000 grams and measuring 240 to 260 millimeters in length.

*Acquisition of the Husqvarna-made revolvers was the consequence of Norway's union with Sweden at that time.

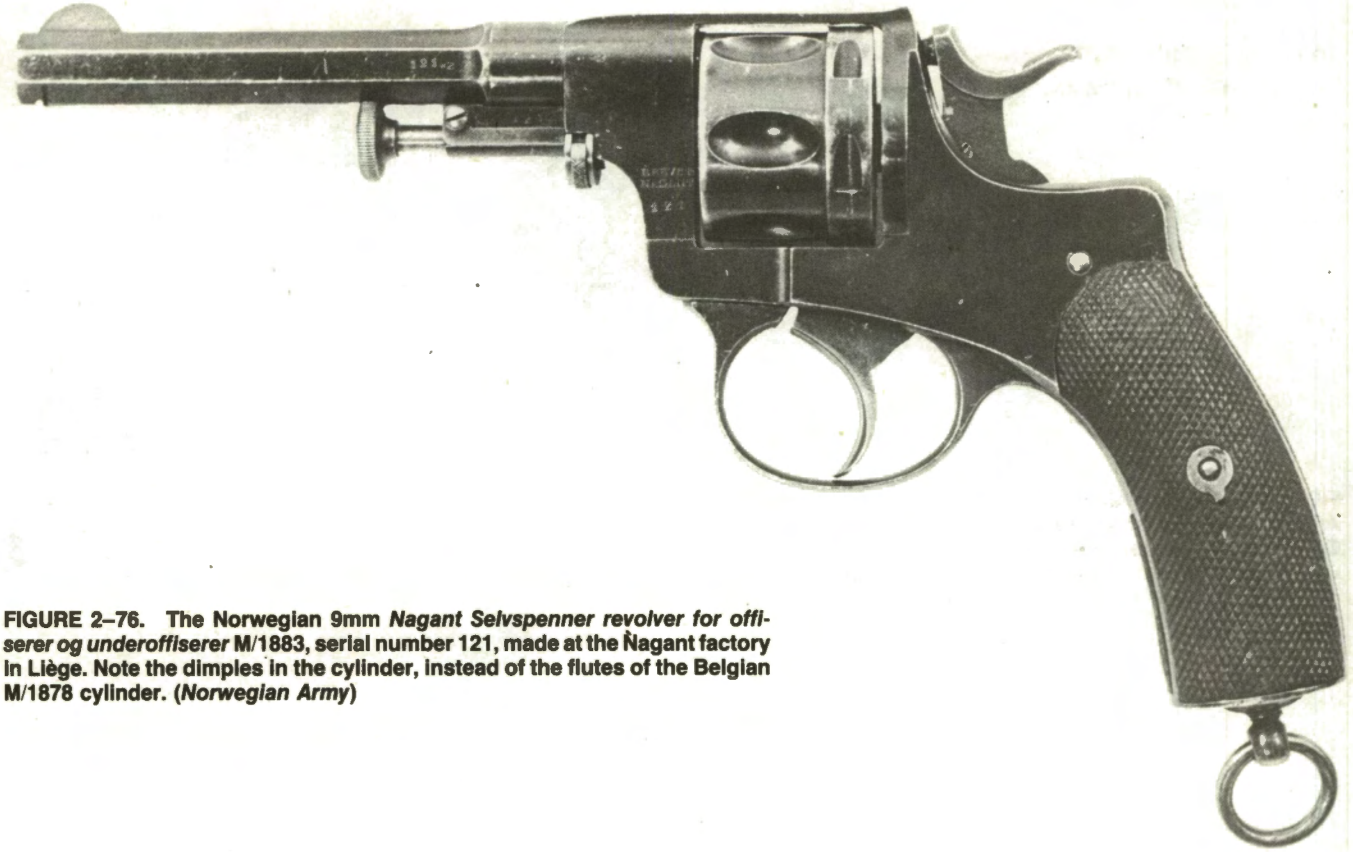


FIGURE 2–76. The Norwegian 9mm *Nagant Selvspenner revolver for offiserer og underoffiserer* M/1883, serial number 121, made at the Nagant factory in Liège. Note the dimples in the cylinder, instead of the flutes of the Belgian M/1878 cylinder. (*Norwegian Army*)

FIGURE 2–77. The Norwegian 7.5mm Nagant revolver M/1893. (*Norwegian Army*)

FIGURE 2–78. The Merwin Hulbert caliber .44–40 Winchester center-fire Army model revolver, manufactured by the Hopkins & Allen Manufacturing Co., Norwich, Connecticut (1876–1880). This was one of the patterns of revolvers acceptable for use by officers in the Spanish War. (*Hogg & Weeks*)

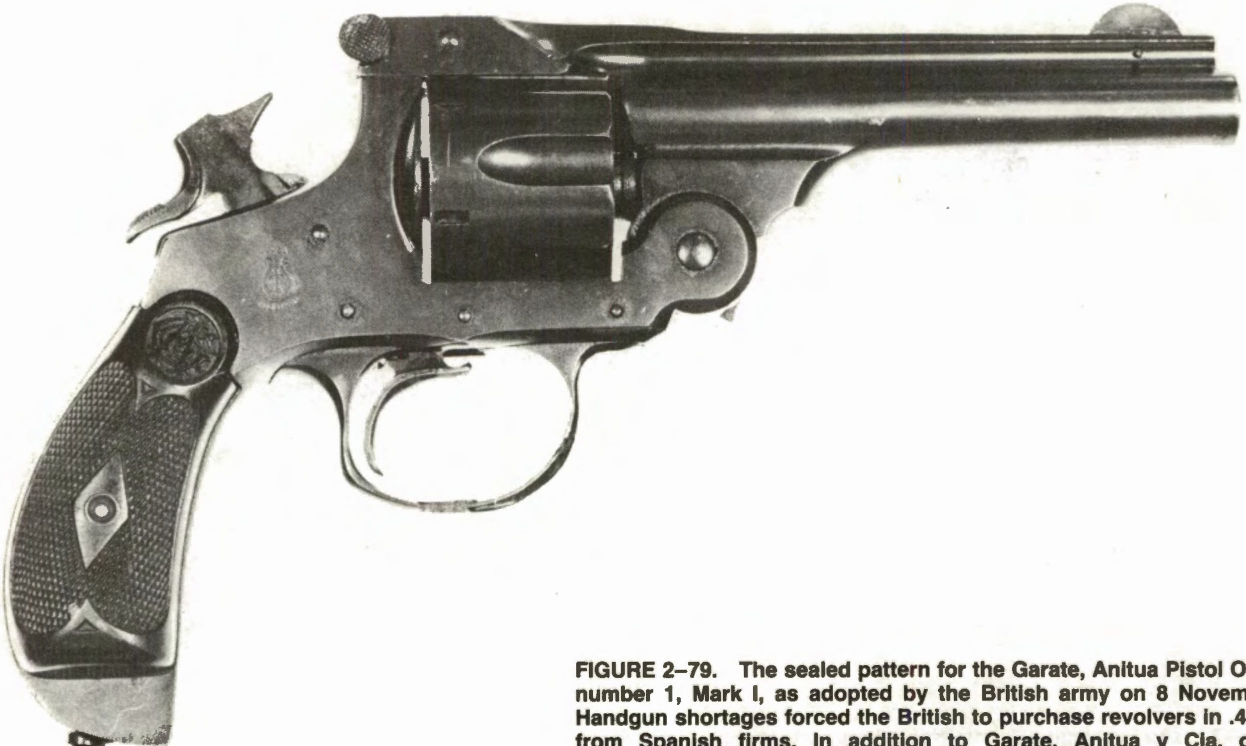


FIGURE 2–79. The sealed pattern for the Garate, Anitua Pistol Old Pattern number 1, Mark I, as adopted by the British army on 8 November 1915. Handgun shortages forced the British to purchase revolvers in .455 caliber from Spanish firms. In addition to Garate, Anitua y Cia, one other firm—Trocaola, Aranzabal y Cia, of Eibar—also produced Old Pattern revolvers for the British, called the number 2, Mark I. (*Hogg & Weeks*)

Models made by Smith & Wesson and Merwin, Hulbert & Company were recommended, and both companies sold their handguns to the Spanish government during the late 1870s and through the 1880s. By royal decree on 6 October 1884, a double-action *Smith & Wesson revolver* fabricated by Orbea y Compañía of Eibar in the Province of Guipuzcoa was approved for purchase by officers and designated the Modelo 1884.

Between 1889 and 1893, 324,964 revolvers were manufactured in Spain (56,370 in 1889, 67,664 in 1890, 65,434 in 1891, 66,101 in 1892, and 69,395 in 1893). Orbea y Compañía was the largest of the Spanish firms, employing 406 persons, with Gárate of Anitua y Cia a close second, having 264 employees. In 1906, four firms in Eibar produced nearly 265,000 arms of all types, with an approximate value of 2.5 million pesetas (about $500,000). By 1908, Eibar manufacturers were making 450,000 guns a year—380,000 revolvers, 17,000 self-loaders, and 53,000 shotguns. Although many late nineteenth century Spanish revolvers were of questionable quality due to the use of cast-iron component parts and inadequate proof test laws, thousands of good-quality handguns were made in Spain during the First World War when England, France, and other countries were placing emergency orders with Spanish handgun makers.[42]

SWEDEN The Swedish artillery purchased 1,065 11mm pinfire revolvers from Eugene Lefaucheux of Paris in 1863. Following the same pattern as the French Naval model, few of these handguns were distributed. On 19 April 1871, the Swedish military adopted the 11mm Lefaucheux-Francotte center-fire, double-action revolver. The majority of these weapons were made by Auguste Francotte of Liège, but a sizable number was also produced at the Husqvarna Vapenfabrik. Between 1872 and 1874, the Swedish cavalry turned in their single-shot, muzzle-loading percussion pistols for the Model 1871 revolvers, and a general order on 31 October 1871 authorized the issuance of the 1871s to troops of the signal units (*Signalkompaniet*). A subsequent general order in 1877 authorized 53 Model 1871 revolvers per artillery battery. Most of the Model 1863 pin-fire pistols were converted to center-fire in 1879 so they could be used with the Model 1871 cartridge. In 1884, the Swedish navy selected the French Modele 1873 revolver for use aboard ship. Called the Model 1884, these revolvers were purchased from the French government arsenal at Saint-Étienne.

As early as 1885, a Swedish army commission had begun to look for a replacement for the Model 1871 revolver. After technical trials with the Austrian Modell 1878 Gasser-Kropatschek, the Belgian Modèle 1878 Nagant, the Swiss Modell 1882 Schmidt revolver, and a revolver designed by Belgian arms maker J. Warnant, the Swedes selected the Nagant and Schmidt revolvers for further tests. Following troop trials with 30 Nagant and 30 Schmidt weapons, the Swedish army chose the 7.5mm Belgian revolver. The first of these were purchased directly from the Nagant factory in Liège, but in 1897 the factory in Husqvarna initiated production of the Nagant revolver. Since at this time Sweden and Norway were unified under the Swedish crown, the first 350 revolvers made at Husqvarna went to Norway. From 1898 until 1905, Husqvarna produced 13,732 Nagant revolvers for the armed forces. Each was delivered with a holster, spare cylinder, cleaning rod, and screwdriver. The Swedish factory also placed their revolver on the commercial market at the price of 35 kroner ($9.38). In 1907, the army began to replace the Nagant with the 9mm *Svensk automatisk pistol M/1907,* the FN Browning Model 1903 self-loading pistol.[43]

SWITZERLAND Throughout the nineteenth century the Swiss were one of the most progressive peoples in the field of small arms. This despite the fact that they did not have a standing army but relied upon a well-equipped, superbly-trained national reserve force. One Swiss military man stands above all other Swiss weapon designers of the last three decades of the nineteenth century. Rudolf Schmidt (1832–1898) left his mark on the design of both the handguns and the shoulder weapons used by the Swiss military forces. From 1871 until his retirement in 1894, Schmidt was associated with the government's weapons activities in Bern. For four years (1871–1875), he was manager (*Leiter*) of the federal small arms assembly workshop (Eidgenössischen Montierwekstätte) in Bern, and he was the first director of the Eidgenössischen Waffenfabrik (Federal Weapons Factory) established in 1875 on the site of the former assembly plant.[44]

In 1871, Swiss ordnance personnel instituted an experimental program toward the adoption of a revolver for the army. Various revolver designs were tested in their original configurations without modifications, and at the end of the trials three models were candidates for adoption: Galand's revolver, with six-shot capacity, shield-type shell ejector, and star-form rifling in 12mm; Smith & Wesson's revolver, with six-shot capacity, star-type ejector, and six-groove rifling concentric with the bore in 11mm; and the Chamelot-Delvigne revolver, also with six-shot capacity but four-groove rifling (one turn in 250 millimeters) in 10.4mm. The Chamelot-Delvigne design was modified by Staff Major Schmidt and retested at Thün Arsenal in March 1872 along with other designs. The Prüfungskommission (test commission) selected the Chamelot-Delvigne as modified by Schmidt as the revolver for service use. The Swiss Bundesrat (parliament) approved the selection the following month. The *Ordonnanzrevolver Modell 1872,* as it was identified, had a barrel length of 155 millimeters and fired a rim-fire cartridge. Initial production was undertaken by the firm Pirlot Frères of Liège. By the end of February 1873, 800 revolvers had been produced and sent on to the Bern Montierwerkstät (arsenal) for issue to the army. To fulfill requirements for 1877, another 100 revolvers were ordered, the last foreign-made handguns procured by the Swiss army.

It is almost impossible to find a Modell 1872 in its original condition for the Swiss had them converted to fire center-fire ammunition in 1878. This modification, known as the Modell 72/78, is also quite rare. An original Modell 1872 had the firing pin in contact with the rim of the cylinder and a loading gate and loading gate spring on the right side of the frame. An Abadie-type, this gate and cylinder lock assembly was weak and not very durable. Conversion of the Modell 1872 to the Modell 72/78 was approved by the government in 1878. For the most part, the handgun as modified varied little in outward appearance to the original. The conversion was done by installing a new hammer and by recutting the firing-pin hole in the recoil plate (integral with the frame) to allow for the use of center-fire cartridges. A strengthened loading-gate

FIGURE 2–80. Two views of the Husqvarna-made Swedish m/1887 7.5mm Nagant revolver. (*Tokol-Tøjhusmuseet and Nonte*)

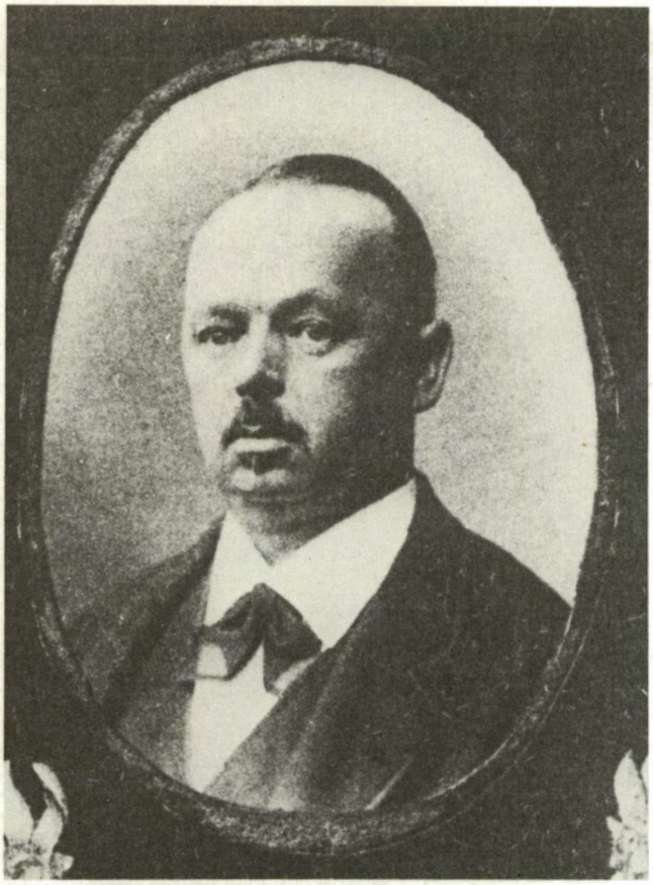


FIGURE 2–81. Rudolf Schmidt, director of the Eidgenössischen Waffenfabrik at Bern, 1875–1894. (*Waffenfabrik Bern*)

spring was installed, which made loading and unloading easier. Very few Modell 72/78s were actually issued, as is indicated by the absence of canton (state) markings on surviving pistols.

On 27 September 1878, the Bundesrat approved a new revolver specification, marking a significant step in Swiss arms manufacturing. For the first time, revolvers were to be made in Switzerland at Bern. Production of the ordnance-personnel-designed gun began in May 1879. The 10.4mm *Ordonnanzrevolver Modell 1878* had a six-shot capacity, solid frame, rod ejector, and Warnant-type lock, similar to that subsequently incorporated into the Enfield Mark I. Modell 1878s also had the Jean Warnant-type rebound lever or mainspring auxiliary, but not the Nagant-style hammer catch on the breast of the hammer. A later Schmidt-Galand lock mechanism incorporated both these features. The lock mechanism on the 1878 was easily exposed by hinging open the trigger guard and side plate assembly, a feature later borrowed by the French in their Modèle 1892 revolver. This weapon was issued only to mounted troops. Between 5,500 and 6,000 were manufactured at the Waffenfabrik Bern. A lighter infantry model was planned, but it was never needed because the 7.5mm Modell 1882 superseded all the 10.4mm revolvers.

By 1880, with the exception of mounted officers, all Swiss troops were armed with either the turn-bolt Vetterli repeating rifle or the Ordonnanzrevolver Modell 1878 revolver. When the Prüfungskommission decided that infantry officers should have a lighter revolver, Lieutenant Colonel Schmidt designed one that fired a new 7.5mm cartridge. The commission, finding Schmidt's new design to be suitable, declared it the new standard revolver for the army in May 1882, and Bern started production early the next year. Serial numbers from the early production of the 1882 revolver run from 1 to 20,000 and can be distinguished by their hard rubber grips. Revolvers numbered from 20,002 to 37,254 had wooden grips. The Modell 1882 was designed as a personal, close-range, self-defense weapon for officers, but Schmidt also believed the revolver had long-range capabilities and produced a special holster-stock for it that gave the user a steadier hold, thus permitting the engagement of targets at longer ranges. The army, however, never officially issued the stock-holster.

In 1885 when Sweden was looking for a new revolver, the officers who tested the Swiss Modell 1882 were impressed, especially with its accuracy, weight, and ballistics. The Swedes, however, thought it too complicated and adopted the Belgian Nagant, chambered it to fire ammunition similar to the Swiss cartridge.

Many of the Swiss Modell 1882 revolvers continued in service until 10 or 20 years after the close of World War II. Over the years, improvements were incorporated into the basic design, making the handgun stronger and safer. Major modifications included (1) construction of the loading gate safety so that it blocked the hammer if uncocked and locked in place if it were cocked, (2) strengthening the revolver top strap from a maximum thickness of 3 millimeters to a minimum thicknesss of 4 millimeters, and (3) installing a reinforced recoil plate.

The Eidgenössischen Waffenfabrik contracted with private industry for Modell 1882 components. These feeder factories shipped parts to the Waffenfabrik Bern where they were assembled into guns, inspected, proof-fired, and then shipped to cantonal depots. Subsequently, the Waffenfabrik Bern manufactured the 1882 for commercial sale with serial numbers that began with the letter *p* for *privat.* Schweizerisch-Industrie-Gesellschaft Neuhausen (SIG), also known as the Waffenfabrik Neuhausen or the Fabrique d'Armes Neuhausen, established in 1853, also made the Modell 1882 for police and commercial markets.

By 1886, all three Swiss revolvers—the 1878, 1872/78, and 1882—were in service. Mounted troops from the ranks to noncommissioned officers were armed with the heavy 10.4mm weapons (1872/78 and 1878), and cavalry and mounted artillery officers carried the 1878. All other officers were armed with the Modell 1882 in 7.5mm. At about this same time, the Swiss were creating a three-tier reserve force composed of the regular (ready) reserve (men ages 18 to 35), the *Landwehr* (men ages 35 to 45), and the *Landstrum* (men 45 and older). The youngest troops were armed with the latest equipment. The second group to receive new arms was the *Landwehr,* then the *Landstrum. Landwehr* officers did not change over to the Modell 1882 revolver until 1888, and *Landstrum* officers were not issued it until 1891. All mounted officers carried the lighter Modell 1882 revolvers, while mounted officers kept the heavier Modell 1878.

In 1901, the Swiss military adopted the Parabellum self-loading pistol designed by George Luger, but in 1929 Waffenfabrik Bern was still producing another variant of the Mo-

FIGURE 2–82. The Swiss 10.4mm rim-fire Modell 1872 and the 10.4mm center-fire Modell 1872/78. *Top*, Modell 1872; *Middle and Bottom*, Modell 1872/78. (*Waffenfabrik Bern*)

FIGURE 2–83. The Swiss 10.4mm *Ordonnanzrevolver Modell 1872*, made at the Waffenfabrik Bern. (*Waffenfabrik Bern*)

FIGURE 2–84. The Swiss 7.5mm *Ordonnanzrevolver Modell 1882*, created by Rudolf Schmidt and produced under his direction at the Waffenfabrik Bern. (*Waffenfabrik Bern*)

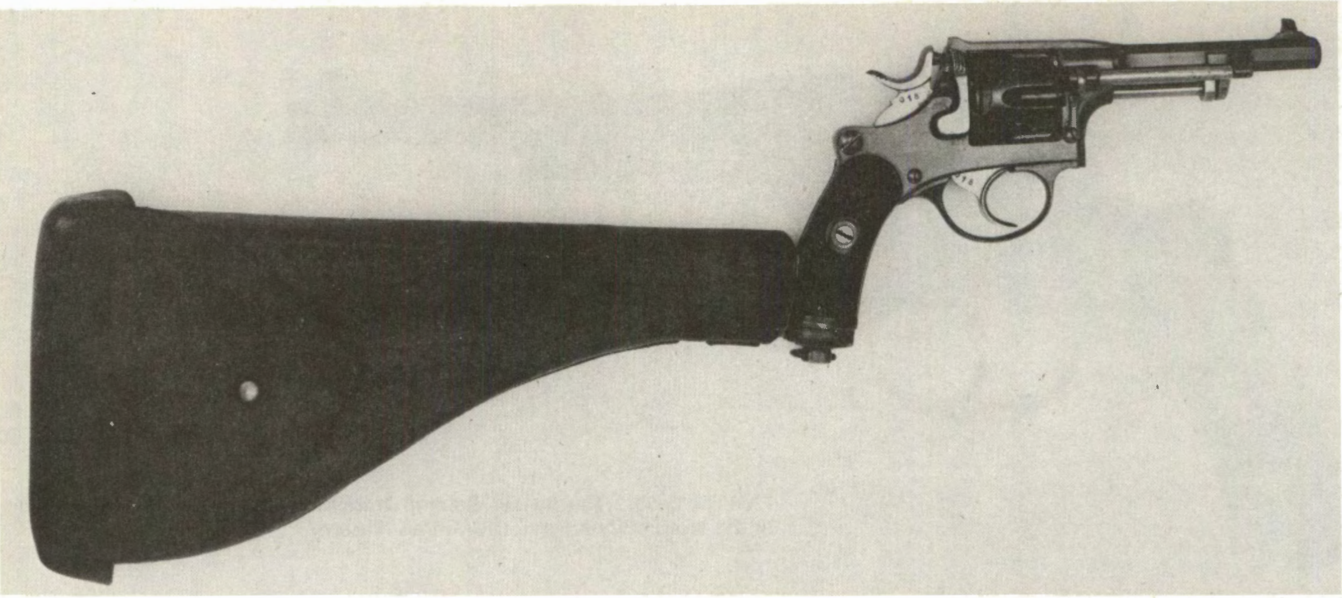


FIGURE 2–85. Swiss Modell 1882 revolver with combination shoulder stock and holster. This experimental stock was not adopted. (*Visser*)

dell 1882 revolver. The frame was strengthened and the lock work simplified, but the *Ordonnanzrevolver Modell 1882/29* was basically an unchanged design. The new self-loaders were issued to officers and noncommissioned officers of the infantry, field artillery, engineers, and quartermasters, while revolvers were still assigned to the noncommissioned officers of the cavalry, transport, garrison, and bicycle troops. With a world depression settling in, it was more economical for the Swiss to continue to build their standard revolver for some of the armed forces rather than to arm all personnel with the *Ordonnanzpistole 06*. The Modell 1882/29 cost 120 Swiss francs ($23), while the new self-loader was 225 Swiss francs ($43). While engineers at Bern designed a less costly version of the self-loader, the factory produced some 18,000 revolvers (serial numbers 50,001 to 68,229), which accounts for the many that remained in service after the Second World War.[45]

TURKEY The Ottoman Empire may have been one of the most feeble imperial powers in nineteenth century Europe

FIGURE 2–86. Swiss 7.5mm *Ordonnanzrevolver Modell 1882/29*. (*Waffenfabrik Bern*)

(thereby earning the name "Sick Man of Europe"), but its military force of 185,000 men still required arms. In 1874, the Turkish Army purchased Smith & Wesson Number 3 Second Russian Model revolvers in .44 (11.18mm) Henry rim-fire. Through 1879, the Turks ordered 15,000 Smith & Wessons (1,000 on 12 August 1874, 2,000 in late 1876, 7,000 on 21 February 1877, and 5,000 in 1879). Along with the Russians, the Turks bought revolvers from Ludwig Loewe of Berlin, who produced an exact copy of the Smith & Wesson Third Russian Model. It is theorized that Ludwig Loewe sold these handguns at a price below Smith & Wesson's, which was $25 in gold. Despite these purchases, until the end of the first decade of the twentieth century, the sword was the only side arm carried by Turkish officers. Revolvers caught on slowly, and as late as 1914, infantry officers still had no formally-issued revolvers or self-loaders.[46]

Russian Revolvers, 1871 to 1900

Handgun development in Imperial Russia followed familiar patterns, but with some unique Slavic twists. Throughout the first half of the nineteenth century, the demand from the military for large quantities of small arms prevented the rapid acquisition of modern weapons. Each year, the managers at the weapons factories in Tula, Sestroretsk, and Izhevsk were fully occupied with filling orders for existing models. New designs were a nuisance at best and nearly always disruptive when it came to meeting production quotas. Throughout the century, handguns were a secondary concern in Russia. A soldier might use a handgun for defense, but the advance of the army was accomplished by the infantry, who carried shoulder-fired weapons with fixed bayonets. (The Russians followed the classic tradition of fixed bayonet charges in an effort to add the psychological edge that a wall of polished, cold steel gave oncoming troops.)[47]

With their vast number of soldiers, it should not be surprising that the Russian army, despite Samuel Colt's gifts of revolvers to Tsar Nicholas I, did not consider replacing the single-shot, smooth-bore, muzzle-loading pistol with a revolver until 1859. Five years after the start of the Crimean War (1854–1856), the Imperial War Minister established a military arms commission to examine the desirability of adopting a new, more modern handgun, but the group's findings were negative.

> . . . reequipping the cavalry with revolvers would be unsatisfactory for the following reasons: revolvers are too expensive, revolvers are too difficult for mounted troops to use, revolvers are too sensitive to dirt and their mechanisms are too easily broken, and repair of damaged revolvers would require the attention of trained armorers who are not always present to carry out such repairs.[48]

Instead, the arms commission recommended the standardization of a single-shot, breech-loading pistol designed by Gilles of Liège. Reportedly similar in concept to the carbine created by James D. Greene, which the Russians had adopted, this .60 caliber (6 *linii,* or 15.26mm) handgun was improved by Fedor Trummer, a Russian government ammunition specialist who had served on the commission. After what has been described as a series of inconclusive trials, the Zhille-Trummer pistol was approved for service in 1863. The weapons factory at Sestroretsk had only limited success in manufacturing it, however. Of the first 100 Model 1863 pistols, only 54 were accepted by government inspectors. Subsequent field experience with the new handgun and the Greene-pattern rifles and carbines revealed several serious deficiencies and all of these weapons were withdrawn from service. The Russians then turned to foreign designs of proven merit. Only after the 1917 revolution was a domestic arms design capability nurtured by the central government.

One of the percussion revolvers the Russians experimented with was the British Beaumont-Adams. Their contact was Auguste Francotte, one of Adams' Liège-based licensees. In Russia, the Beaumont-Adams was called the Tula-Norman revolver, since it was manufactured in small quantities at Tula under the direction of I. G. Norman, a longtime employee of that factory. Figure 2–86, serial number 62, carries barrel markings in Russian script reading *tul' skii zavoda Normanya* (Tula factory—Norman). This weapon was apparently made in only small quantities. The first revolver to be adopted in any numbers was the Galand Model 1870 self-extracting cartridge revolver.

Charles-François Galand, born in 1832 in France, established factories in France and Belgium and business partnerships with manufacturers in England. As with so many late nineteenth century arms designers and entrepreneurs, little is known about Galand's work or his various business organizations, but he was very important to the world of handguns because of his inventiveness and his promotional activities on behalf of his designs. His first revolver, adopted by the Russian navy, was unique in that the frame was articulated so that barrel and cylinder slid forward on the cylinder pin when the opening lever was hinged downward. An extractor plate or shield did not move as far forward, and it was by that action that the cartridges were extracted from the cylinder. The rims of the cartridge cases were held back by the shield (British patent 3039, 5 October 1868). Called the *Revolver Galand à extracteur automatique,* this revolver was introduced in 1868 and is sometimes called the Model 1868.*[49] While both the British (1870, 1871) and the Swiss (1872) tested the Galand self-extracting revolver and thousands were sold privately to army officers of many countries, the Russians were the only government to purchase it as an offical weapon. The Galand revolvers for navy service in Russia illustrated are numbered 650 (Tula-made) and 662 (Nagant-made).

The first revolver to be used in significant numbers by the Russian army was a modified Smith & Wesson Model 3. Adoption of the American handgun was not an overnight affair. For many years, the Imperial War Ministry had refused to consider the recommendations of the experts it appointed to study the question of revolvers. They ignored the advice of Goryunov, one of their small arms specialists, in 1861, a

*A. Sommerville, who shared Galand's patents, was involved with the Birmingham gunmakers, trading under the name Braendlin, Sommerville & Co. This company may have manufactured the Galand revolver in England. The revolver was definitely made in Liège and Tula and perhaps in Paris, too.

FIGURE 2–87. The 9.8mm Tula-Norman version of the Beaumont-Adams percussion revolver, bearing serial number 62. The Russian barrel markings read "tul'skii zavoda Normanya." (*Sotamuseo*)

report by Captain N. I. Chagin in 1866, and recommendations by weapon designer Goltykov in 1866. The catalyst came in the form of Colonel Aleksandr P. Gorlov.

Gorlov, like Schmidt in Switzerland, was one of those singularly important characters who was present in every successful ordnance establishment. In 1866, acting in his capacity as a permanent member of the Artillerii Komiteta (artillery committee)* Gorlov visited the United States to study the various breech-loading shoulder weapons being tested by the U.S. Army Ordnance Department. As a consequence of this summer-long sojourn, Gorlov arranged for the purchase of trial quantities of the Model 1862 Gatling Gun, and he came in contact with the directors of several major American small arms makers. Russia subsequently adopted the Gatling gun in .41 caliber (10.4mm), purchasing 90 guns directly from the Gatling Gun Company (Colt actually made them). Gorlov also was responsible for obtaining the license that allowed the Russians to manufacture Gatling guns, appropriately called Gorlovs in Russia. While in America Gorlov also met General Hiram Berdan which led to the selection of two different types of Berdan rifles for use by the Russian Army—the Models 1868 and 1871.[50]

Gorlov became involved in the search for a new revolver for the Russian armed services in 1870 while he was living in Hartford, Connecticut. He had temporarily taken up residence in the United States to supervise the inspection of the Gatling Guns and the 30,000 Model 1868 Berdan rifles (No. 1) that were being made by Colt for Russia. After a seemingly protracted negotiation, Gorlov, by now a general, signed a contract with Smith & Wesson on 1 May 1871 for 20,000 modified Number 3 revolvers at a unit price of $13.02. A cash advance of $50,000 in gold was made to help defray Smith & Wesson's cost for new tooling.

The Russian ordnance specialist specified several

*Artillery in Russia also denoted ordnance development and acquisition.

FIGURE 2–88. The 10.4mm Galand revolver, serial number 650, as manufactured in Russia at the Tula weapons factory in 1878. (*Sotamuseo*)

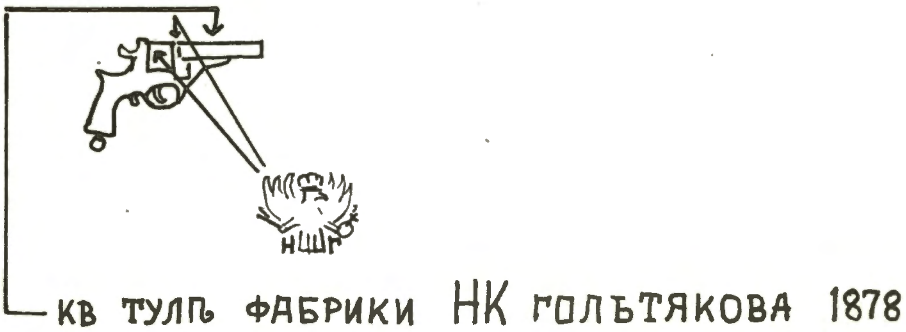


FIGURE 2–89. The barrel markings for the Galand revolver in figure 2–88. (*Sotamuseo*)

FIGURE 2–90. A 10.4mm Galand revolver made by Nagant in Liège. Note the Liège proof mark on the cylinder. (*Tokoi*)

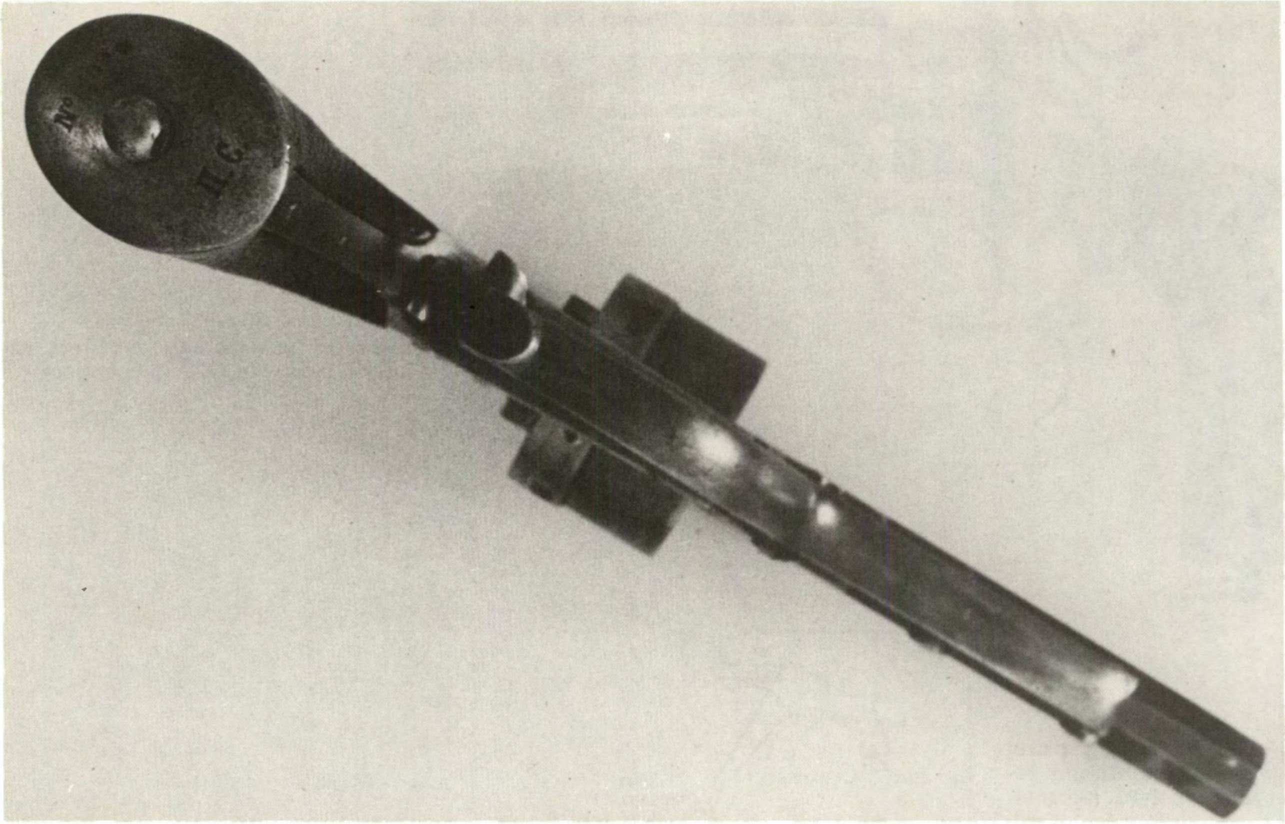


FIGURE 2–91. Russian markings on butt of pistol grip of Liège-made Galand revolver. (*Tokol*)

changes in the Model 3, including an alteration of the cylinder so it would chamber a slightly different .44 caliber (11.18mm) cartridge. Unlike the standard Smith & Wesson .44/100 (11.18mm) cartridge, the Russian round, called the .44 (11.18mm) Smith & Wesson Russian, had a cartridge-case diameter that was slightly larger than the projectile. The chambers of the cylinder had a step instead of being bored straight through. Gorlov also asked that the Smith & Wesson barrel markings be in Cyrillic instead of Roman letters. A series of other minor changes were included as production commenced.[51] Gorlov and his colleague Captain Kasavery Ordinetz were tough customers, and their rejection of faulty revolvers often dismayed the people at Smith & Wesson. In defense of his diligence as an inspector Gorlov explained that he was personally accountable to the Tsar for the quality of each weapon, and if there were any failures or injuries to Russian personnel because of manufacturing flaws, Gorlov or Ordinetz would be held to blame. In such an event, the Russian said his best course of action would be to take one of the revolvers and end his own life rather than face disgrace and death at home. Fortunately, the Russian inspectors were successful in their tasks.

As production of the Russian Model revolvers continued, Captain Ordinetz decided that a better grip configuration was needed to keep the revolver from shifting in the user's hand. In December 1871, the design staff at Smith & Wesson began experiments with the shape of the pistol grip, and from this effort evolved the Second Model Russian Smith & Wesson revolver. The factory told Gorlov in the winter of 1872 that these revolvers could be produced at a cost of $15.35 each at the rate of 100 pistols per day. In January 1873, a contract for 20,000 Second Models at a price of $15.33 each was agreed to, and the revolvers were delivered during the next year. A third design soon came off the drawing boards at Smith & Wesson—the Third Model, or New Model Russian.* This revolver was considerably different from the Second Model Russian, with the major changes centering around an improved spring-loaded extractor mechanism and a modified barrel assembly that incorporated an integral forged front sight. The length of the new barrel was reduced to 165 millimeters; the First Model's was 191 millimeters, the Second Model's 178 millimeters. The major advantage associated with the improved extractor mechanism was that it permitted the quick and easy removal of the cylinder from the handgun without tools. The cylinder could be pulled free from the weapon by four quick turns on the cylinder retaining screw, opening the revolver, and depressing the extractor return catch. Daniel Wesson patented this improvement (patent 158,874, 19 January 1875). The Russians considered this a significantly improved weapon and issued it to the cavalry. Inspection of these American-made pistols was supervised by Ordinetz, now a colonel, until 1876 when he was succeeded by Captain N. Kouschakewitsch.[52]

Smith & Wesson continued delivering handguns to the

*First and Second Models are often called Old Old Model and Old Model, with the Third Model being called the New Model.

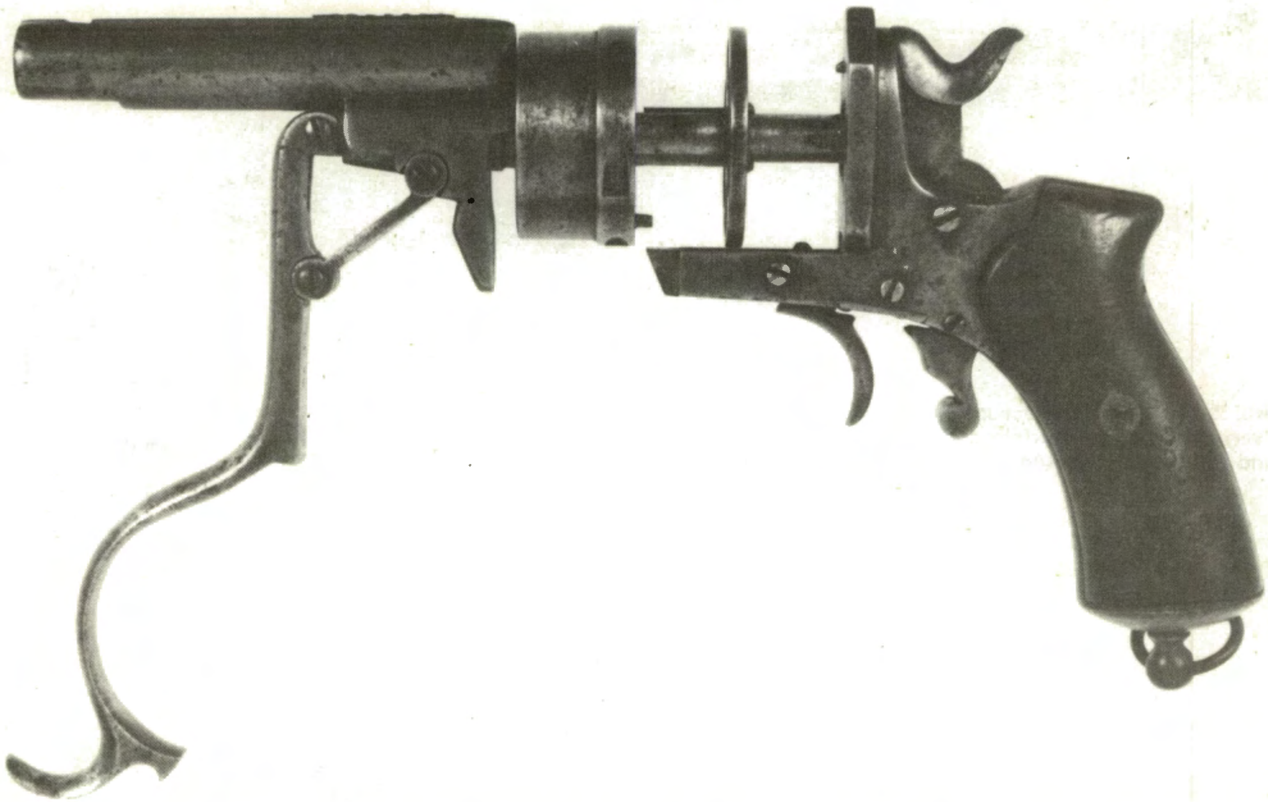


FIGURE 2–92. Galand revolver opened to illustrate the operation of the extractor. (*Smithsonian*)

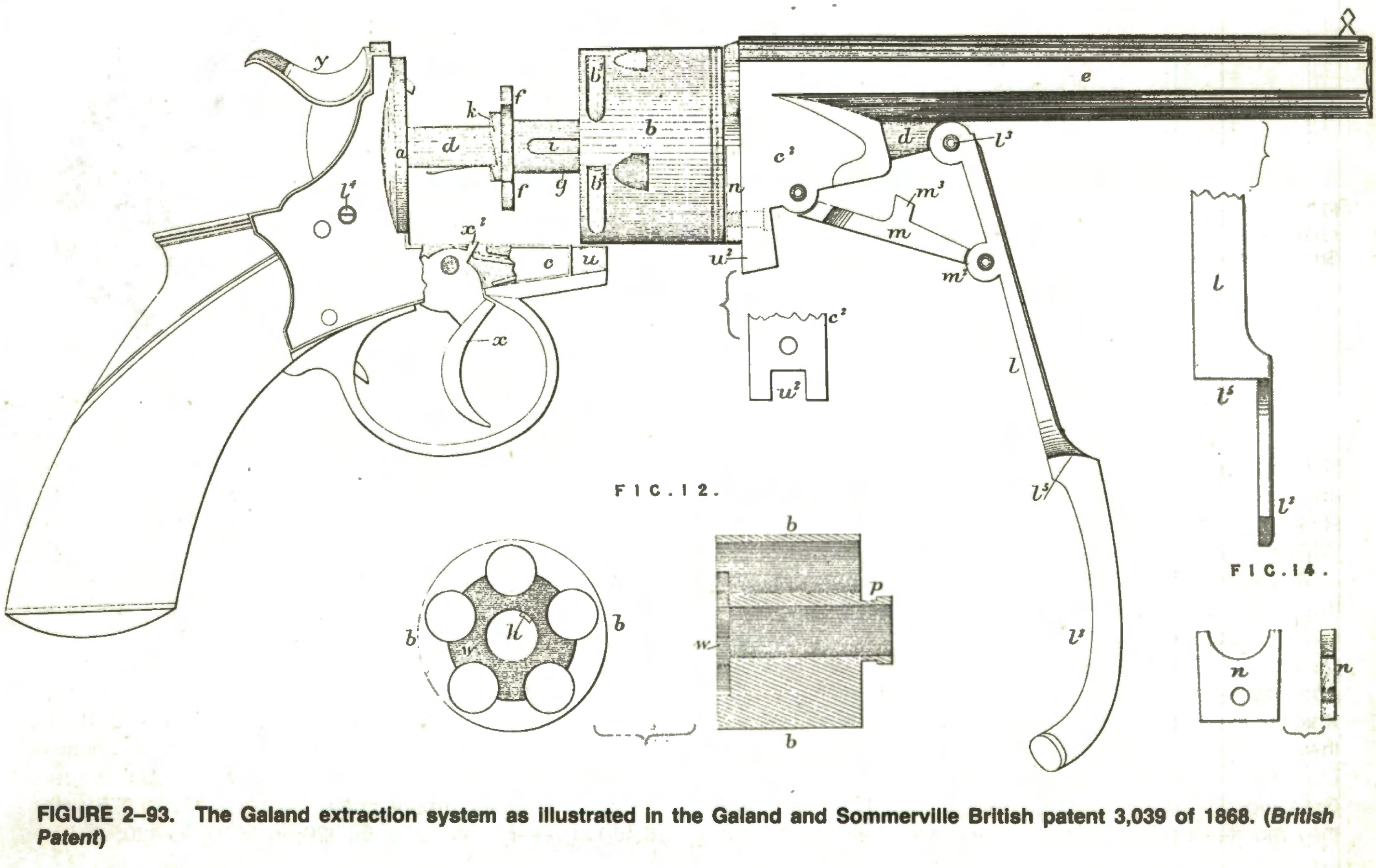


FIGURE 2–93. The Galand extraction system as illustrated in the Galand and Sommerville British patent 3,039 of 1868. (*British Patent*)

FIGURE 2–94. Smith & Wesson .44 caliber Model 3, Russian First Model revolver, with modifications introduced by Gorlov and Ordinetz (the so-called Second Type). Manufactured in 1871–1872. (*Sotamuseo*)

FIGURE 2–95. Smith & Wesson .44 caliber Second Model Russian Army revolver, serial number 4056, manufactured in 1873. This model was built by Smith & Wesson from 1873 to 1878 for issue to infantry officers. (*Sotamuseo*)

Russians until the Russians contracted with Ludwig Loewe and Company in 1878 for a substantial quantity of Third Model Russian Smith & Wesson-type revolvers to be made in Berlin. While the exact details of this contract are not known, at least 70,000 were purchased from the German firm. It is likely that the Russians turned to Loewe because they wanted eventually to acquire tooling and machinery to manufacture this pistol at their own weapons factory at Tula. When the Imperial Army had gone shopping for the tooling and machines with which to make the Second Model Berdan rifle (Model 1871), they had investigated two British firms, Greenwood & Batley Ltd. of Leeds and the Birmingham Small Arms Company. Greenwood & Batley subsequently provided them with what they required at Tula. Ludwig Loewe was likely the source of the machine tools—allegedly copies of the Pratt & Whitney machines used at Smith & Wesson—on which Tula workers later manufactured the Third Model Russian revolver. Production appears to have begun in 1886 and continued until at least 1892, and an American intelligence publication indicated in 1903 that the Smith & Wesson might still have been in production at that time.[53]

The Third Model revolver was used on both sides of the Russo-Turkish War in 1877–1878. While the Turkish military acquired about 15,000 revolvers between 1874 and 1879, the Russians purchased more than 201,000. One Soviet historian summarized the number of Smith & Wesson-type revolvers available to troops in the field: in 1877, 70,275, with 6,490 in reserve; in 1878, 90,320; in 1879, 95,420; and in

FIGURE 2–96. The Third Model Russian revolver as manufactured by: *top*, Smith & Wesson, serial number 7374; *middle*, Ludwig Loewe, serial number 16,676; and *bottom*, Tula, serial number 2642. (*Sotamuseo*)

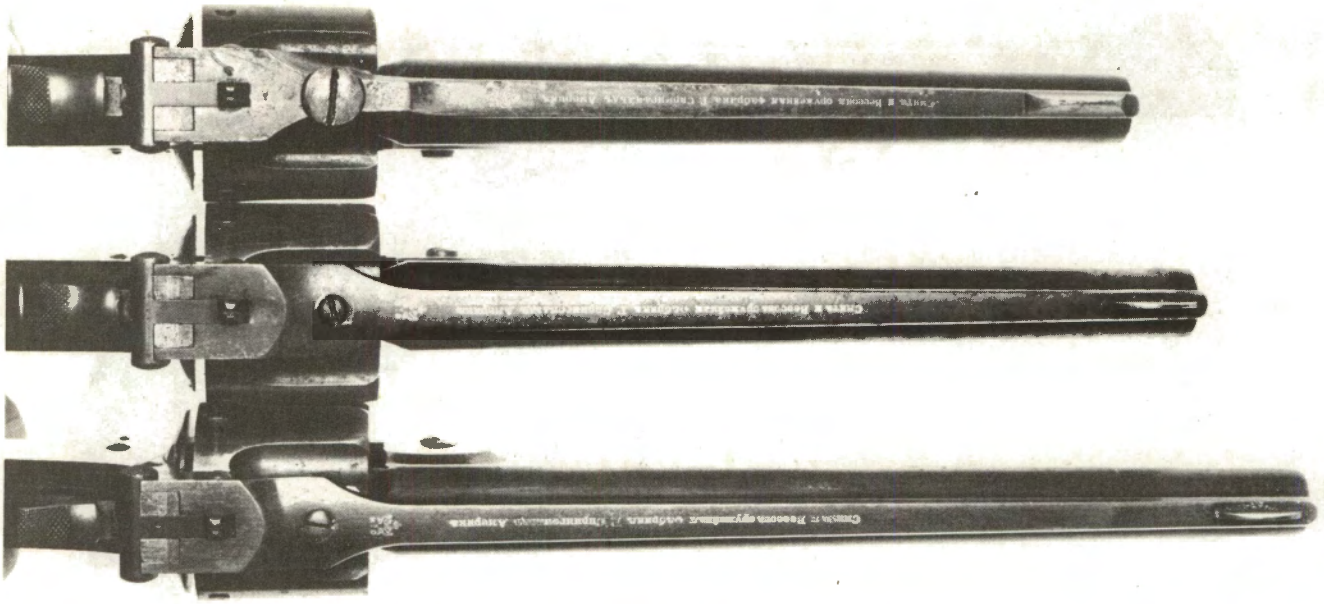


FIGURE 2–97. The three barrel lengths of the Smith & Wesson revolvers: *top,* First Model at 191 millimeters; *middle,* Second Model at 178 millimeters; and *bottom,* Third Model at 165 millimeters. (*Sotamuseo*)

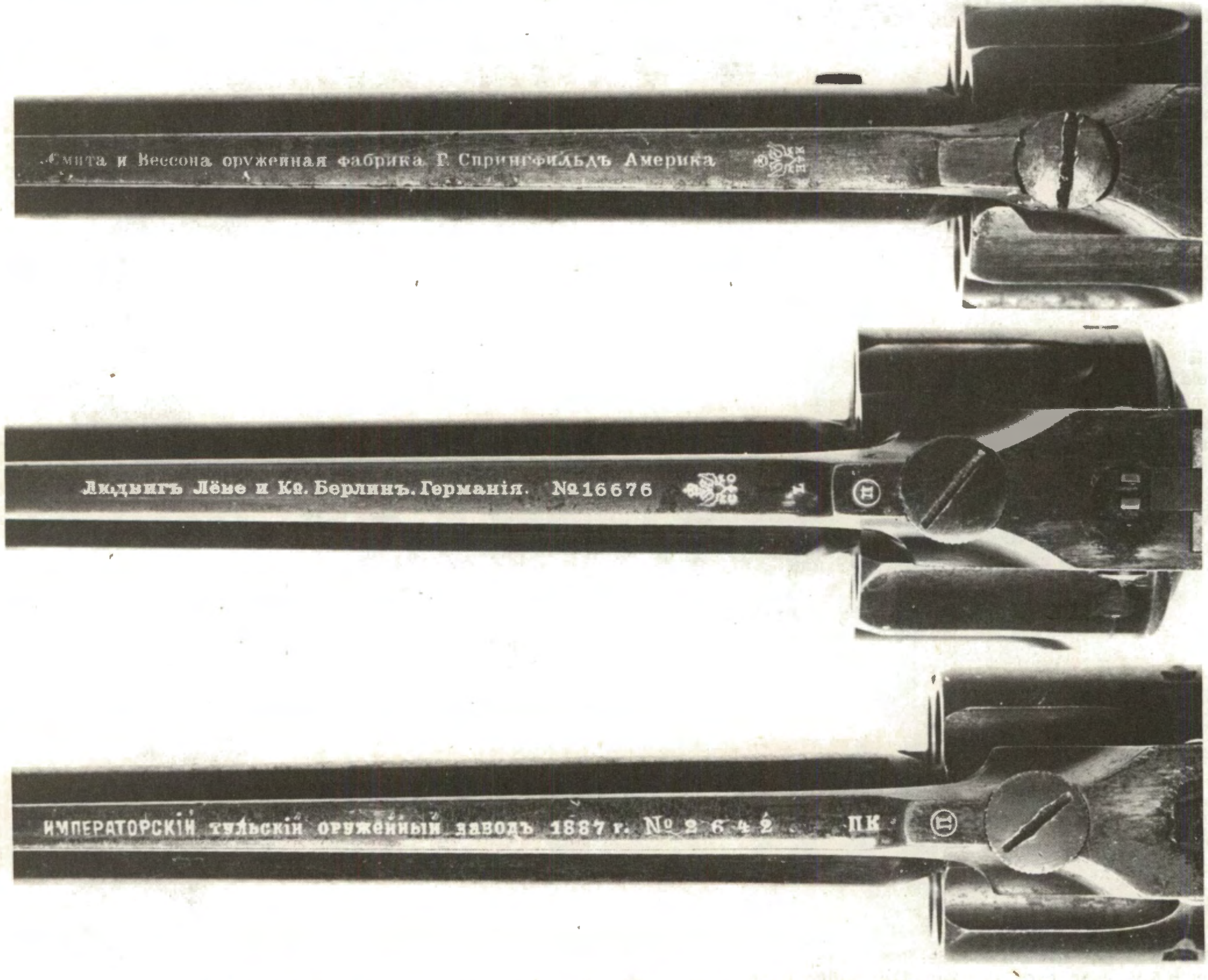
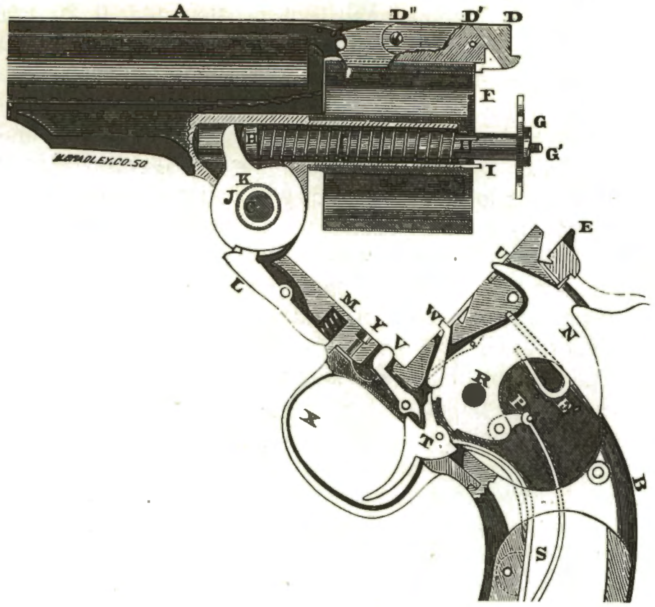


FIGURE 2–98. Barrel markings from the Third Model Russian revolver. (*Sotamuseo*)



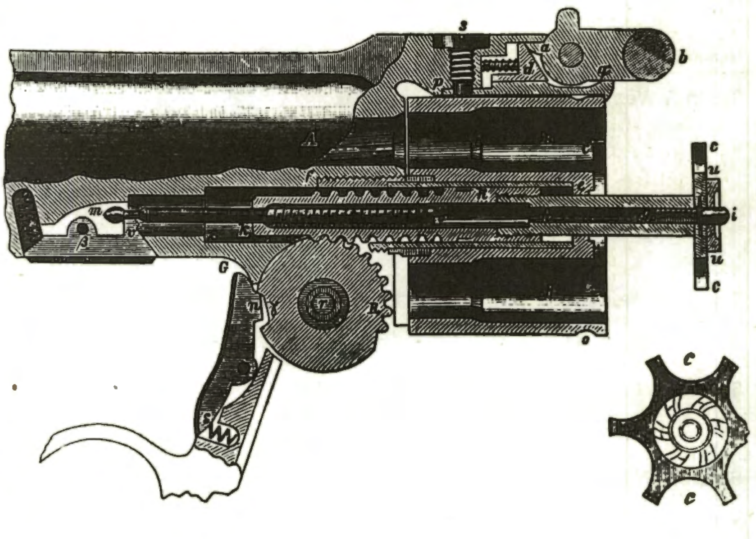


FIGURE 2–99. These drawings illustrate: *top*, the Schofield and, *bottom*, Third Model Russian versions of the Smith & Wesson Model 3 revolver. The differences between these two revolvers lie in the design of the extractor mechanisms and the manner in which the cylinders are chambered. (*Top: U.S. Army. Bottom: Budayevskiy*)

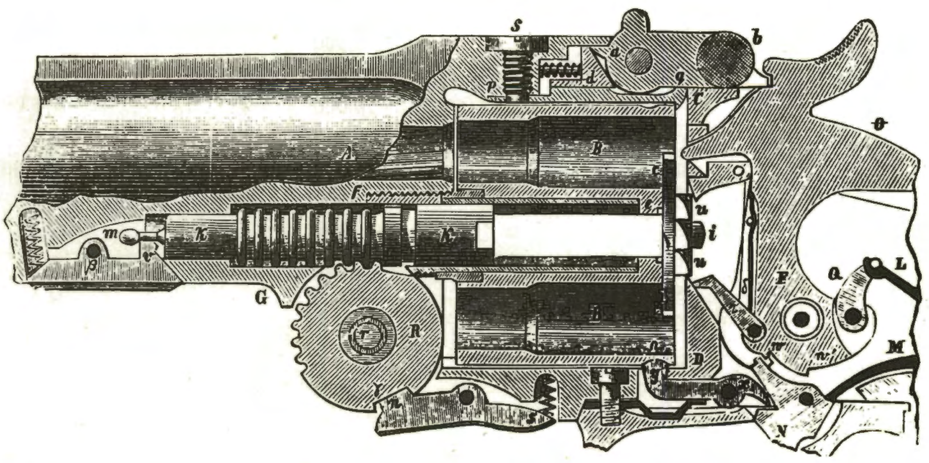


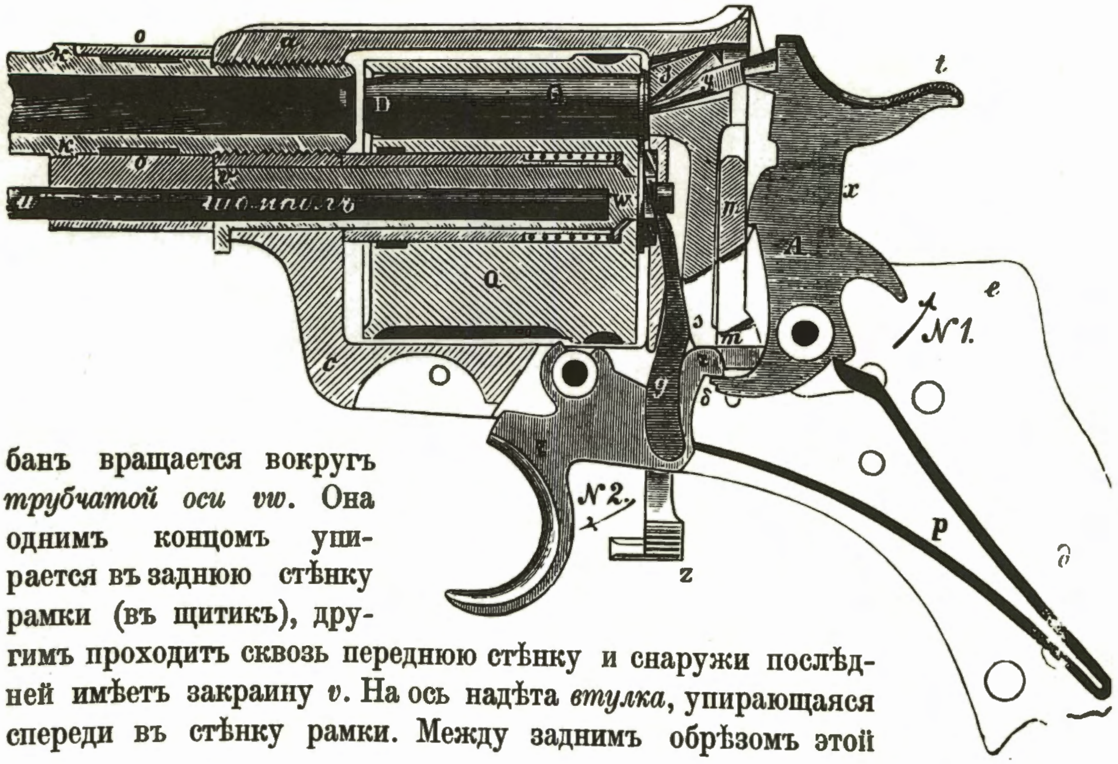
FIGURE 2–100. The Model 3 Russian revolver lock mechanism. Note the difference between the hammer and barrel latch of this pistol and that of the American Schofield revolver. (*Budayevskiy*)

1880, 99,552, with 13,100 in reserve.[54] In 1880, only 112,652 revolvers were still available to the Russians. Ignoring the weapons ordered from Ludwig Loewe and just counting against the 131,138 purchased from Smith & Wesson, there was a loss of at least 18,486 revolvers, or about 7 percent, in 8 years. General Nicholas N. Golovine in the 1930s commented on the carelessness of the average Russian soldier when it came to the maintenance of and accountability for his weapons. As chief of staff in the Seventh Army, he created special detachments to collect and repair small arms abandoned on the field of battle.[55]

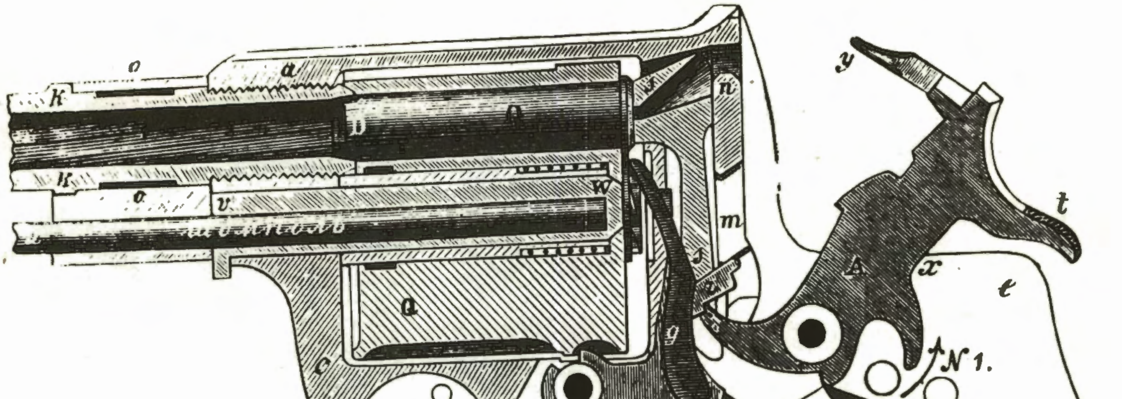
In 1895 Russian military officials, following the trend established throughout Europe, adopted a small caliber revolver, the Nagant "gas-seal" revolver. Conceptually, this type of revolver can be traced back to Elisha Collier's patent of 1818. In the 1880s, Henri Pieper of Liège revived the idea of closing the gap between the front of the cylinder and the rear of the barrel. He used the cartridge case as an obturator to effect the seal (British patent 2,167, 15 February 1886). In 1894, Léon Nagant patented the most effective gas-seal revolver ever manufactured (British patent 14,010, 20 July 1894; French patent 220,988, 16 April 1892). Figure 2–100 from Budayevski's *Kurs artillerii* (1912) helps to explain the operation of the Nagant gas-seal. As illustrated, the mechanism is the single-action model, which was issued to Russian noncommissioned officers. In the double-action officer's model, there is a hammer catch attached to the breast of the hammer and a modification to the sliding wedge-block safety (fig. 2–100,n). All that was required for changing the pistol to double-action (or vice versa) was the exchange of these two parts. The seven-shot, solid-frame, gate-loaded, rod-extractor revolver employed a 7.62 × 38mm (.30 caliber) cartridge that completely enclosed the projectile. The mouth of the cartridge projected 1.5 millimeters from the front of the revolver chamber when the cylinder was in its rearward or resting position. When the pistol was cocked, the cylinder was thrust forward so that a male cone on the rear end of the barrel was seated in the female cone at the forward end of the cylinder. The protruding cartridge case sealed any remaining gap between the barrel and cylinder, thus making

TABLE 2-11 PRODUCTION OF SMITH & WESSON RUSSIAN MODEL REVOLVERS

Contractor/ Manufacturer	Date of Contract	Model	Quantity	Price Each
Smith & Wesson	1 May 1871	Russian Old Model	3,000 (1st variation) 17,000 (2nd variation)	$13.03
Smith & Wesson	15 Jan. 1873	Russian Second Model (Infantry)	20,000	$15.33
Smith & Wesson	15 Dec. 1873	Russian Second Model (Infantry)	20,000	N/A
Smith & Wesson	27 Oct. 1874	Russian Third Model (Cavalry)	11,138	$15.27
Smith & Wesson	27 Oct. 1874	Russian Second Model	10,000	$15.00
		Russian Third Model	10,000	$15.00
Smith & Wesson	27 Jan. 1877	Russian Second Model	10,000	$15.00
		Russian Third Model	10,000	$15.00
Smith & Wesson	1 May 1877	Russian Second Model	10,000	$15.00
		Russian Third Model	10,000	$15.00
Ludwig Löewe	1877–1878	Russian Third Model	70,000	N/A
Ludwig Löewe	1884	Russian Third Model	30,000	N/A
Tul'ski Oruzheiniy Zavod (Tula)	1886–1893(?)	Russian Third Model	80,000–160,000 est.	N/A



банъ вращается вокругъ *трубчатой оси vw*. Она однимъ концомъ упирается въ заднюю стѣнку рамки (въ щитикъ), другимъ проходитъ сквозь переднюю стѣнку и снаружи послѣдней имѣетъ закраину *v*. На ось надѣта *втулка*, упирающаяся спереди въ стѣнку рамки. Между заднимъ обрѣзомъ этой



втулки и кольцевымъ уступомъ на ней помѣщена *возвратная спиральная пружина*, сжимающаяся при надвиганіи барабана на стволъ. На заднемъ основаніи барабана вокругъ центральнаго отверстія имѣется *7 зубцовъ*, за которые захватываетъ при взведеніи курка *собачка g*. На боковой поверхности барабана въ промежуткахъ между камо-

FIGURE 2–101. The operating mechanism of the Nagant gas-seal revolver. *Top,* the revolver in the uncocked condition. Note the gap between the cylinder and the barrel and the length of the cartridge case. *Bottom,* the revolver in the cocked condition. Note that the cylinder has moved forward to close the gap between the cylinder and the barrel. (*Budayevskiy*)

FIGURE 2–102. A sectionalized Model 1895 Nagant gas-seal revolver. This view helps to illustrate the design features of this handgun. (*Musée d'Armes de Liège*)

FIGURE 2–103. A Liège-manufactured gas-seal Model 1895 Nagant revolver marked "L. Nagant Brevet Liege 1898," serial number 11,751. (*Hogg & Weeks*)

FIGURE 2–104. Russian-made Model 1895 Nagant gas-seal revolver marked "Imperatorskii Tul'skii Oruzheiniy Zavod' 1907," serial number 6916. The earliest model seen by the author was dated 1899, with serial number 4293. The revolvers made at Tula were numbered in series started each year. (*Tokol*)

FIGURE 2–105. A Model 1895 Nagant gas-seal revolver with the markings of the Tula factory, serial number 8320, made in 1923. (*Nonte*)

a nearly perfect gas seal. The forward movement of the cylinder was effected by the pawl (g), which also rotated the cylinder as in other revolvers. As the pistol was cocked, the bump on the top of the trigger (directly above the trigger pin) engaged the locking notches on the cylinder. Thus, the pawl rotated the cylinder. The pawl was then disengaged (by the action of an inclined surface in the slot in which it traveled) so it could press against the rear of the cylinder and press it forward along its axis as the cocking process continued. Forward movement of the cylinder compressed a spring so that the cylinder could return to its rest position after the hammer fell and the trigger was released.

FIGURE 2–106. Reduced-size Model 1895 Nagant revolver with an 84-millimeter barrel rather than the standard 114-millimeter barrel. It is also 57 grams lighter than the standard model. (*U.S. Army*)

While the cocking sequence was taking place, the trigger propelled a vertically-moving wedge block (n) upwards. The wedge block forced another part (j) forward and against the base of the cartridge, which would then be fired. This abutment piece (j) prevented any rearward movement of either the cartridge or the cylinder that might break the gas seal. Although this sounds complicated, it was a relatively simple mechanism that performed its function very effectively. Upon release of the trigger, the lower limb of the mainspring returned the trigger to its rest position. This movement withdrew the wedge block. The abutment rotated to the rear about its own pivot point, being propelled by the cylinder, which was pushed to its rest position by its own spring. Because the bolt lump on the trigger engaged the locking notches on the cylinder only when the revolver was cocked, the Nagant brothers created another mechanism for indexing the cylinder. This was accomplished by the spring-loaded loading gate, which engaged notches in the rear rim of the cylinder. This device, specifically covered in the British patent, worked when the loading gate was either completely opened or completely closed. As in all of the post-1887 Nagant revolvers, the gas-seal model had a hammer rebound mechanism powered by an extension to the upper arm of the mainspring. The extension bore against the base of the hammer to tilt it rearward away from the cartridges.

The Russian Army adopted the Nagant gas-seal revolver as the *Revolver Sistemy Nagana obrazets 1895 goda* (Nagant system revolver Model 1895) and generally referred to it simply as the Nagan,* a word that became synonymous in Russia with revolver, just as Browning later came to mean self-loading pistol. The Imperial Government purchased the first of their new revolvers from the Nagant brothers in Liège, who as Manufacture d'Armes Nagant Frères also provided the Russians with the necessary tooling, jigs, fixtures, and inspection gauges with which to manufacture the gun at Tula. The main administration commission of the Imperial Army scheduled a domestic production quota of 10,000 to 20,000 revolvers per year beginning in 1897. By that time, the factory would be leveling off production of the Mosin-Nagant 7.62mm Model 1891 rifle.

As in all armies, the basic concern of the Russian leadership was the production of rifles, the basic arm of the ground forces. The government, therefore, purchased only 20,000 Nagant revolvers from Liège between 1895 and 1898. Tula began delivering revolvers in 1898 with a total quota of 180,000 being set for the years 1898 to 1902. By contrast, Tula produced 204,000 Model 1891 Mosin-Nagant rifles in 1894, 256,000 in 1895, 272,000 in 1896, 240,000 in 1897, 230,000, in 1898, 185,000 in 1899, 150,000 in 1900 and 1901, and 49,000 in 1902. Revolver production for the five-year period was about equal to a single year's rifle production. On the eve of the First World War, the Imperial Army had nearly acquired its goal of 436,210 Model 1895 revolvers, with more than 3.9 million Mosin-Nagant rifles in stock.[55]

FIGURE 2–107. Leather holster for the Model 1895 Nagant gas-seal revolver. (*Musgrave*)

TABLE 2-12 COMPARISON OF RUSSIAN SMITH & WESSON AND NAGANT REVOLVERS

	4.2-lineyaya (10.6mm) Revol'ver Sistemy Smita i Vessona obr. 1880g (Third Model Russian Smith & Wesson)	*3-lineyaya (7.62mm) Revol'ver Sistmy Nagana obr. 1895g (Model 1895 Nagant)*
Overall length (mm)	**305**	**229**
Weight (grams)	**1,135**	**790**
Barrel length (mm)	**165**	**115**
Projectile weight (grams)	**15**	**7**
Muzzle velocity (meters/sec)	**229**	**275**
Energy (joules)	**388**	**262**

CONCLUSIONS

By the end of the nineteenth century, the major armies of Europe had adopted a military revolver that was used primarily as a cavalry weapon, with a secondary role as a personal defense weapon for infantry officers and other dismounted personnel who did not carry a rifle. The trend in the last decade was toward smaller caliber revolvers (7.62 to 9mm) that used smokeless powder to propel the lighter projectiles at increased velocities. Only the British persisted in their use of the larger man-stopper-type bullets. A U.S. Army

*In Russian, the *t* in Nagant was dropped.

intelligence report noted in 1896 that the Russians and Italians were among the first to use smokeless powder and that the French Modèle 1892 and the Russian Model 1895 pistols were the only ones at that time using full metal-jacketed projectiles.

Evaluating the military revolver, U.S. Army experts said that it was fair to draw the following conclusions about these weapons as they stood in 1896:

> First.—The ordinary range of usefulness of or dependence upon, the revolver in service will be limited to 50 yards [45.72 m] or a little more, the proof of which lies in the fact that the service arms are generally only so sighted.
> Second.—The size, weight, and composition of the bullet . . . should be such to produce the proper shock effect—enough to stop a man, or perhaps even a horse.[57]

The authors of this report found existing revolvers to be wanting. The Austrian 9mm 1878 Gasser-Kropatschek revolver had not proven to be very effective, and "the shock caused by this bullet, even when fired at a very short range, is not sufficient to put a man immediately out of action." Experiments in 1894 with the 8mm cartridge later used in the Modell 1898 Rast and Gasser revolver indicated that the bullet passed through animal targets, producing limited shock effect and providing effective damage only when vital organs were hit. An 1892 French report from the Ećole Normale de Tir (School for Musketry Instructors) at Châlons stated that: "The revolver M.'73 bullets are incapable, even at the muzzle, of breaking the limbs of a horse. This projectile will not always pierce the back of a human skull, if it strikes with the slightest degree of obliquity, or if the cartridge be at all old or permeated with moisture. (It is stated that some revolver bullets kept at Tonquin [Indochina] deteriorated in initial velocity so as to only average 90 meters. The bullet under the impulse of this velocity was only able to produce a slight, i.e., not dangerous contusion.)"[58] Although the ballistics specialists at Châlons promoted a 7- to 8-gram zinc projectile traveling at 300 meters per second to produce an energy of 360 joules at the muzzle, the French army subsequently adopted the Modèle 1892 cartridge, which had a 7-gram copper-jacketed bullet with a muzzle velocity of 220 meters per second with an energy yield of 168 joules.

American intelligence analysts concluded that the velocity of small caliber pistols would have to exceed 300 meters per second before the shift to smaller diameter, lighter projectiles was advisable.[59] Small caliber rifles produced devastating effects at close range, but that was due in large part to their significantly higher velocity. Whereas the Model 1892 Krag rifle adopted by the United States had a muzzle velocity of 610 meters per second, producing 2633 joules with a 14.3-gram bullet, the .38 caliber New Army revolver 9.6-gram bullet traveled at only 230 meters per second, with a muzzle energy of 256 joules. Clearly, the velocity of handgun projectiles was more significant to increased performance than the weight of the bullet.

In the early years of the twentieth century, there would be considerable debate over the correct velocity, diameter, and weight for a handgun cartridge. Some authorities, such as British Lieutenant Colonel George V. Fosbery, argued on behalf of larger and heavier bullets. In an 1896 lecture before the Royal United Service Institution in London, he commented:

> While almost every pistol is made sufficiently accurate to shoot well at distances at which it would be folly to use, *stopping power* is, I fear, sadly neglected in almost all which I am acquainted, whether Belgian, English or American, always excepting the Colt's Frontier Pistol [Model 1873] carrying the cartridge of the Winchester Repeater [.44–40]. As, however, if only the bore is large enough, this power can be conferred by the use of a properly constructed bullet, and a charge of powder calculated for this purpose than for range and penetration, the fault can be remedied.[60]

Other experts, like Georg Luger, the creator of the Parabellum self-loading pistols, or the Mauser designers of the Model 1896 self-loader, would argue for 7.65 to 9mm projectiles traveling at relatively high velocities—345 to 445 meters per second—to deliver the necessary shock power.

Despite the progress that had been made in the development of handguns by 1900, there were still many unanswered design and ammunition issues to be investigated. The revolver was the standard handgun in nearly every army of the world, but it came in many different forms. And just as this weapon reached its pinnacle of mechanical development, a new kind of handgun was rising to challenge its place. The self-loading pistols of the last years of the 1800s provided the background for the development of the self-loaders used in World Wars I and II.

NOTES

1 *Army and Navy Journal* 4 (16 March 1867):474.

2 The Thuer story is told in John E. Parsons, *The Peacemaker and Its Rivals: An Account of the Single Action Colt* (New York: William Morrow and Co., 1950), pp. 141–58. A newer and more detailed account of the single-action Colts is presented in Ron Graham, John A Kopec, and C. Kenneth Moore, *A Study of the Colt Single-Action Army Revolver* (Dallas: Taylor Publishing Co., 1976).

3 *Army and Navy Journal* 7 (25 September 1869):85.

4 Ibid., (28 July, 1870):768.

5 U.S. War Department, *Report of the Secretary of War Being Part of the Messages and Documents Communicated to the Two Houses of the Congress . . .*, 42nd Cong., 2nd sess., vol. 1 (Washington, 1871), p. 252.

6 Ibid.

7 Ibid.

8 U.S. Army Chief of Ordnance, *Ordnance Notes* 5 (Washington: GPO, 1873).

9 U.S. War Department, *Report of the Secretary of War . . .*, 43nd Cong., 1st sess., vol. 3 (Washington: GPO, 1873), p. 10.

10 Parsons, *The Peacemaker and Its Rivals*, p. 30.

11 Ibid., pp. 33–34.

12 From the *New York Herald,* 18 December 1882.

13 Joseph Wickham Roe, *English and American Tool Builders* (New Haven, CT: Yale University Press, 1916), pp. 173–74.

14 Endorsement of letter, 10 August 1878, Records Office Chief of Ordnance, Springfield Armory, letters sent, June 1876–Oct 1879 Record Group 156 National Archives and Records Service, Washington, D.C.

15 Chief of Ordnance, *Annual Report for 1888–1889* (Washington: GPO, 1889), pp. 137–39.

16 "Revolver Shooting," *Cavalry Journal* 2 (March 1889):37–38.

17 Parsons, *The Peacemaker and Its Rivals,* p. 78.

18 War Department, *Annual Report of the Secretary of War for the Year 1892,* vol. 3 (Washington: GPO, 1892), p. 341.

19 Letter, John H. Hall to Alfred Mordecai, 13 March 1896; letter, Mordecai to D. W. Flagler, 17 March 1896; letter, Hall to Flagler, 28 May 1896; letter, Mordecai to Flagler, 3 Sept. 1896; letter, Hall to Mordecai, 5 Oct. 1896; letter, Mordecai to Flagler, 10 Oct. 1896, with endorsements; letter, Hall to Flagler, 13 Oct. 1896; letter, Hall to Flagler, 2 Nov. 1896; letter, Hall to Flagler, 22 Dec. 1896; circular letters distributed 29 April 1896 recalling Model 1892 revolvers with serial numbers 1–8,000 (e.g., R. Birnie to Commanding Officer, Rock Island Arsenal, 29 April 1896); letter, Mordecai to Flagler, 25 Jan. 1898; telegram [?] Arnold to Flagler, 13 June 1898; and Chief of Ordnance, *Annual Report for 1896* (Washington: GPO, 1897), pp. 47–48. All of the above letters are part of file 13,092, entry 28, General Correspondence New Series, Office, Chief of Ordnance, 1894–1911, Records of the Ordnance Dept., Record Group 156, National Archives and Records Service.

20 Norm Flayderman, *Flayderman's Guide to Antique American Firearms . . . and Their Values* (Northfield, IL: DBI Books, 1977), pp. 94–95.

21 Chief of Ordnance, *Annual Report . . . for 1897* (Washington: GPO, 1898), p. 25.

22 Ibid.

23 Chief of Ordnance, *Annual Report . . . for 1899* (Washington: GPO, 1900), pp. 161–67; Parsons, *The Peacemaker and Its Rivals,* pp. 23–27; John A. Kopec, "The Colt Artillery Model Single-Action," *American Rifleman,* May 1976: pp. 30–32; and Russell F. Weigley, *History of the United States Army* (New York and London: Macmillan Co., 1967), pp. 567–69.

24 Jock Hasswell, *The British Army: A Concise History* (London: Thames & Hudson, 1975), p. 102; and *The Dictionary of National Biography Supplement, 1901–1911* (Oxford: Oxford University Press, 1966), pp. 94–97.

25 H. J. Alderson, *Memorandum on Revolvers: 1872 to 1887* (London: War Office, 1887), p. 4. Unless otherwise noted, this section on British revolvers is based upon this document and a draft of material prepared for this book by Peter Labbett, "Evolution of Military Cartridge Revolvers Used by the U.K.: 1868–1900," 1980.

26 Details of the evolution of this lock mechanism can be found in W. H. J. Chamberlain and A. W. F. Taylerson, *Adams' Revolvers* (London: Barrie & Jenkins, Ltd., 1976), pp. 185–93, 201–02.

27 Alderson, *Memorandum on Revolvers,* pp. 4–8.

28 The Webley history is fully covered in William Chipchase Dowell, *The Webley Story: A History of Webley Pistols and Revolvers, and the Development of the Pistol Cartridge* (Kirkgate, Leeds: The Skyrac Press, 1962).

29 The Green-Webley controversy is described in Dowell, *The Webley Story,* pp. 110–11; and in A. W. F. Taylerson, *The Revolver, 1865–1888* (New York: Bonanza Books, 1966), p. 79.

30 War Office, *Instructions for Armourers in the Care, Repair, Browning, &c, of Small Arms, Machine Guns, "Parapet" Carriages, and for the Care of Bicycles* (London: His Majesty's Stationery Office, 1912), p. 1.

31 W. H. J. Chamberlain estimates that 470,000 Webley service .455 revolvers were manufactured. *See* Chamberlain, "Webley Service-Pattern 455 Caliber Revolvers," in Joseph J. Schroeder, Jr., *Collector's Gun Digest,* vol. 2 (Northfield, IL: DBI Books, 1977), pp. 49–54.

32 Taylerson, *The Revolver, 1889–1914* (New York: Crown Publishers, 1971), pp. 120–38; Roy G. Jinks, *History of Smith & Wesson* (North Hollywood: Beinfield Publishers, 1977), pp. 203–05; and Sevellon Brown, *The Story of Ordnance in the World War* (Washington: James William Bryan Press, 1920), p. 132.

33 *The World Almanac for 1893* (New York: Press Publishing, 1893), pp. 253–55, 259.

34 Claude Gaier, *Four Centuries of Liège Gunmaking,* trans. F. J. Norris (Liège and London: Eugène Wahle and Sotheby Parke Bernet, 1976).

35 Taylerson, *The Revolver, 1889–1914,* p. 99.

36 Ian V. Hogg, *German Pistols and Revolvers, 1871–1945* (New York: Galahad Books, 1971), pp. 20–21; Chamberlain, "Faithful Soldiers of the German Empire . . . the Modell 1879 u. 1883 Deutsche Armee-revolvers," in Schroeder, *Gun Collector's Digest,* pp. 10–29.

37 Military Information Div., Adjutant General's Office, War Dept., *Notes and Statistics of Organization, Armament, and Military Progress in American and European Armies,* no. 4 (Washington: GPO, 1894), p. 77.

38 Ian V. Hogg and John Weeks, *Pistols of the World* (London: Arms and Armour Press, 1978), p. 46.

39 Military Information Div., *Notes and Statistics,* p. 80.

40 F. C. Skaar and O. Nielsen, *Haerens Håandvåapen: Pistoler og Revolvere, 1814–1940* (Oslo: Haermuseet Åkerhus, 1954).

41 Taylerson, *The Revolver, 1889–1914,* pp. 108–09.

42 Ibid., 108–10; J. I. Paul Arzac, *Evolucion de la Industria Armera de Eibar* (San Sebastian: Cámara de Comercio, Industria y Navegación de Guipuzcoa, 1976), pp. 21–25; and José Rodriguez, *50th Anniversary—Astra: Unceta y Compañía, S.A.: 1908–1958—Biografia de una Empresa* (Guernica: Astra, 1958), pp. 5–6.

43 Josef Alm, *Arméns Eldhandvapen Förr och Nu* (Stockholm: Hörsta Förlag AB, 1953), pp. 261–68, 362–63; Bengt Lissmark, *Svenska Försvarets Pistoler och Revolvrar, 1683–1958* (Karlskrona: Vapenlitteraturforlaset, Trossos, 1974), pp. 79–89; and Jan Tuvesson, *Gamla Svenska Jaktvapen* (Höör: Ji-Te Förlag, 1976), pp. 241–42.

44 Waffenfabrik Bern, *100 Jahre Eidg. Waffenfabrik Bern: 1871–1971* (Bern: Waffenfabrik, 1971), p. 15 ff; and Eugen Heer, "Rudolf Schmidt: Offizier, Konstrukteur, Schütze und Autor," reprint from *Allgemeine Schweizerische Militarzeitschrift* (no. 6, 1970): no pp.

45 Fritz Hausler, *Schweizer Fausfeuerwaffen: Die Schweizer Pistolen und Revolver von 1817 bis heute in Wort und Bild* (Frauenfeld: Verlag Fritz Häusler, 1975), pp. 19–47, 120–25; and John Walter, *Luger: An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1870 to the Present* (London: Arms & Armour Press, 1977), pp. 102–03.

46 Jinks, *History of Smith & Wesson,* pp. 76–77, 81, 96–98; and Taylerson, *The Revolver, 1889–1914,* p. 113.

47 L. G. Beskrovnyi, *Russkaya armiya i flot v XIX veke: Voennoekonomicheskii potentsial Rossii* (Moscow: Izdatel'stvo "Nauka," 1973), pp. 277–329.

48 V. G. Fyedorov, *Evolyutsiya strelkovogo oruzhiya,* vol. 1, Razvitie ruchnogo ognestrel'nogo oruzhiya ot zaryazhaniya s dula i kremnevogo zamka do magazinnikh vintovok (Moscow: Gosudarstvennoe Voenneo Izdatel'stvo Narkomata Oborony Soyuza SSR, 1938), p. 136.

49 Gérard Galand, "En Feuilletant l' Album . . . Galand," *Antiquearmes* 3 (Sept. 1975): 213–17; "Les revolvers au Musée d'Armes de Liège," *Bulletin du Musée d'Armes de Liège* 4 (Oct.–Dec. 1889): 63–69; *Notes sur le Revolver-Galand et Instructions pour le maniement de cette arme* (Paris: Imprimerie Central des Chemins de Fer, 1869); and N. Pototski, *Sovremennoe ruchnoe oruzhie, ego svoistva, ustroistvo i upostre'leniye . . .* (St. Petersburg: Tipografiya A.S. Suvorina, 1880), p. 274.

50 Fyedorov, *Evolyutsiya strelkovogo oruzhiya,* pp. 114–19; and Paul Wahl and Donald R. Toppel, *The Gatling Gun* (New York: Arco Publishing Co., 1965), pp. 39, 41.

51 Details of the modifications to the Smith & Wesson Model 3 revolvers are presented in Jinks, *History of the Smith & Wesson,* p. 65 ff.

52 Ibid., pp. 63–66, 73, 79–81.

53 Edward C. Ezell, "James Henry Burton and the Transfer of the 'American System' to the Armories of the Imperial Russian Government," paper, Twentieth Anniversary Conference of the Hagley Program, Eleutherian Mills-Hagley Foundation, University of Delaware, April 1975, published as "James Henry Burton et le transfert du 'système americain' aux arsenaux du gouvernement impérial russe," *le Musée d'Armes* 5 (June 1977): 13–20; Taylerson, *The Revolver, 1865–1888,* p. 73; and Second (Military Information) Div., U.S. General Staff, War Dept., *Bulletin of Military Notes, No. 1, 31 December 1903* (Washington: GPO, 1904), p. 257.

54 Beskrovnyi, *Russkaya armiya i flot,* pp. 309–10.

55 Nicholas N. Golovine, *The Russian Army in the World War* (New Haven, CT: Yale University Press, 1931), pp. 129–30.

56 Beskrovnyi, *Russkaya armiya it flot,* p. 320; and Edward Ralph Goldstein, "Military Aspects of Russian Industrialization: Defense Industries, 1890–1917," unpublished Ph.D. dissertation, Case Western Reserve University, 1971, pp. 99–100, 178.

57 Military Information Div., Adjutant's General Office, War Dept., *Notes and Statistics of Organization, Armament, and Military Progress in American and European Armies,* no. 8 (Washington: GPO, 1896), pp. 209.

58 Ibid. pp. 209–10.

59 Ibid.

60 "On Pistols," *Royal United Service Institution Journal* 40 (Dec. 1896): 1460.

3 THE SELF-LOADING PISTOL TO 1900

By the end of the nineteenth century, inventors were turning their attention to the creation of many types of self-actuated guns—pistols, rifles, and machine guns. If one technological innovation can be spotlighted as being the catalyst for this activity, it would be the development of smokeless propellant gun powder. With the availability of this clean-burning propellant, designers could create weapons that operated automatically without worrying about the dirt and residue that were left behind by black powder.

A particular type of cartridge had been evolved for use with the revolving pistol mechanism. It had a straight-sided, cylindrical case bearing a substantial flange, or rim, around the perimeter of its head, or base. This flange ensured that the cartridge kept the correct position for ignition of the primer by the firing pin. The cartridge also had a surface against which an extractor could act to remove fired cases from the chambers. In addition, the revolver cartridge was loaded with a blunt, conical bullet that was usually cast, or swaged, from a very soft lead alloy and coated with lubricant to ease its passage through the barrel and prevent leading, the adherence of lead particles from the bullet to the bore surface. In revolvers, this type of cartridge performed admirably, even when loaded with black powder. Consequently, early designers of self-loading pistols experimented with this same kind of cartridge.

Designers of early automatic pistols encountered three serious problems in building mechanisms that could handle existing rimmed, lead-bullet, black powder cartridges. First, the large cartridge case rims interfered with loading and feeding from almost any type of magazine, and the rim increased the necessary width of the pistol mechanism. Second, the excessive amount of fouling generated by black powder (over 55 percent of the powder was converted to solid residue during combustion) hopelessly clogged auto-loading mechanisms after the firing of a relatively few rounds. And third, the successful operation of an auto-loader required that the cartridges be stripped from the magazine and deflected by feed surfaces into the chamber with speed and force great enough to deform the soft lead bullets. Reliable feeding was virtually impossible.

To solve the third problem, the rim at the rear of the case was removed to allow the cartridges to stack smoothly in a magazine. These rimless cartridges took less space and fed more smoothly into the chamber. But when the flange was removed, a seat had to be provided for the extractor. A cannelure, or groove, was cut around the perimeter of the case head. Some pistol designers attempted to simplify this pattern even further by eliminating the extractor, depending solely on gas pressure to remove fired cases from the gun.

With the rim removed, there was no surface on the cartridge to form a reliable stop to control the depth to which it could enter the chamber. This was remedied in two different ways. One method required eliminating the crimping of the case mouth on the bullet. The bullet was made to fit very tightly in the case mouth, leaving the mouth uncrimped and forming a square shoulder that could seat a corresponding shoulder at the front of the chamber and properly control the depth to which the cartridge entered the chamber. The second method required leaving a very slight beveled flange protruding at the rear of the case. The very slight rim prevented the cartridge from entering the chamber and allowed the case mouth to be crimped upon the bullet. This design is referred to as *semi-rimmed,* and is found today in .38 ACP (9.7 mm), .25 ACP (6.35mm), and .32 ACP (7.65mm) cartridges. It was also utilized from time to time in other rounds that are now obsolete. The rimless case is found in all modern center-fire, autoloading pistol cartridges. A few calibers embodied slightly bottle-necked cases, but the majority were more or less cylindrical with just enough taper to ease extraction.

Ammunition Development

Ammunition development—cartridge cases, projectiles, and propellant charges—was an important aspect of self-loading pistol design. Gunpowder had always been a simple mechanical mixture of 75 parts saltpeter, 15 parts charcoal, and 10 parts sulphur. After the ingredients had been refined, ground, and sieved, cakes of the mixture were crushed and graded into various size grains, the largest of which were used for cannons, the finest for pistols. Besides being dirty, black powder produced large clouds of dense, white smoke when fired, and gun designers and users alike had long wished for a propellant that would leave the barrel residue-free and the shooter clear of the telltale smoke.

A smokeless powder that would break down chemically into completely gaseous products would be a boon. Eliminating solid residue would mean cleaner gun bores and mechanisms. In addition a substance that would oxidize completely would be more efficient than one that did not, thus producing greater velocities. An ideal smokeless powder would burn progressively, creating more uniform pressures in the barrel. The search for an alternative to black powder grew out of early nineteenth century work in organic chemistry, particularly in the bathing of organic substances in nitric acid.

In 1833, Henri Braconnot, a French professor of chemistry, began to study the effects of nitric acid on starch, cotton, and linen. He called the residue resulting from the immersion of nitrated starch in cold water xylidine. Five years later, Theophile J. Pelouze, another French chemist, discovered that xylidine heated to 180 degrees Celsius would burn with great vigor and predicted that a substance of this sort might be applicable to artillery. It was Christian Frederick Schonbein, a chemistry professor at the Swiss University of Basel, who brought the work of Branconnot, Pelouze, and others to a conclusion. In the mid-1840s he produced a highly explosive compound by treating absorbent cotton with a mixture of nitric and sulphuric acids. After experimenting with gun cotton, ordnance experts in France, Germany, England, and the United States were forced to conclude that it was too irregular and violent in action to be used as a propellant. Still, gun cotton burned completely and produced very little smoke. Forty years passed before a solution to the propellant puzzle was found.

Investigators meanwhile experimented with the elements that made up black powder. Captain Eduard Schultze of the Prussian artillery followed up research begun by English varnish manufacturers Barmwell and Rollason replacing the charcoal (carbon) used in black powder with nitrocellulose (nitrated plant fibers; in this case wood chips). Schultze extracted the cellulose fibers from the wood chips, bathed them in nitric acid, and then impregnated the fibers with a solution of potassium and barium nitrates. By 1865, he had produced the first smokeless powder. Friederick Volkmann's factories in Breslau, Silesia, marketed this propellant for sporting uses. Ultimately over thirty varieties were manufactured in several countries, but metallic salts in the oxidizing agents prevented complete smokelessness and the ballistic inconsistencies of the powder kept it from being used as a military propellant. Subsequent tests by Volkmann were thwarted by the Austrian government gunpowder monopoly and the secrecy imposed by the patent system.

While English and German experimenters continued their parallel investigations, Paul Vieille, a French military engineer, got lucky. In 1886 his cellulose nitrates turned into a gelatinized mass when exposed to too much solvent. Upon substituting pure cellulose (the cell wall of plant fiber) for his cellulose nitrates, he found that the resulting gelatinized mass when dried was an excellent propellant. Made into propellant grains, this smokeless powder was named *Poudre B,* in honor of the French War Minister General Boulanger. The general, still smarting from French losses in the Franco-Prussian War, promptly coined the phrase "New Smokeless Powder, and revenge for Alsace Lorraine." Vieille's Poudre B was a pyrocellulose that embodied less nitrogen than gun cotton and more than pure nitrocellulose. This propellant was categorized as a single-base powder because it was gelatinized nitrocellulose and the solvent used as the gelatinizing agent was not an explosive.

Most of France's rivals later adopted double-based smokeless powders in which the gelatinizing agent was also an explosive. Alfred Nobel, the father of dynamite—nitroglycerine impregnated in diatomaceous earth—patented *Ballistite* as a propellant in 1888. A year later, the British adopted a variation of Ballistite. Also in England the next year, Sir Frederick Abel and James Dewar patented a nitroglycerine-gun cotton mixture, which when forced through a macaroni-making machine became *Cordite.* With the appearance of smokeless powder, a new era in small arms design was now possible.[1]

EARLY EXPERIMENTS WITH SELF-LOADERS

Hiram S. Maxim (1840–1916), an American inventor who found professional success and wealth in Europe, created the first practical self-operating small arm in 1883. His early career centered on the perfection of gas and electrical lighting devices, but while visiting the Paris Exhibition of 1881 he became impressed by the various attempts that had been made to create rapid-fire weapons. But he noted that not one of these was self-actuated. In 1883 Maxim modified an 1866 Winchester rifle to operate by recoil by attaching a movable butt plate with a strong support. A series of jointed levers connected the butt plate to the lever action trigger guard, so that upon firing, the recoil thrust the weapon back against the shooter's shoulder, which in turn compressed the spring between the stock and butt plate. This action pushed the levers forward and cocked the rifle through the operation of the lever. The compressed spring closed the bolt mechanism once it had been opened. While not a very practical adaptation, this modification did prove that the recoiling forces could be used to operate a firearm if a satisfactory mechanism could be designed.

Maxim received British (343 in 1884) and American (297,278 on 22 April 1884) patents for his conversion of the

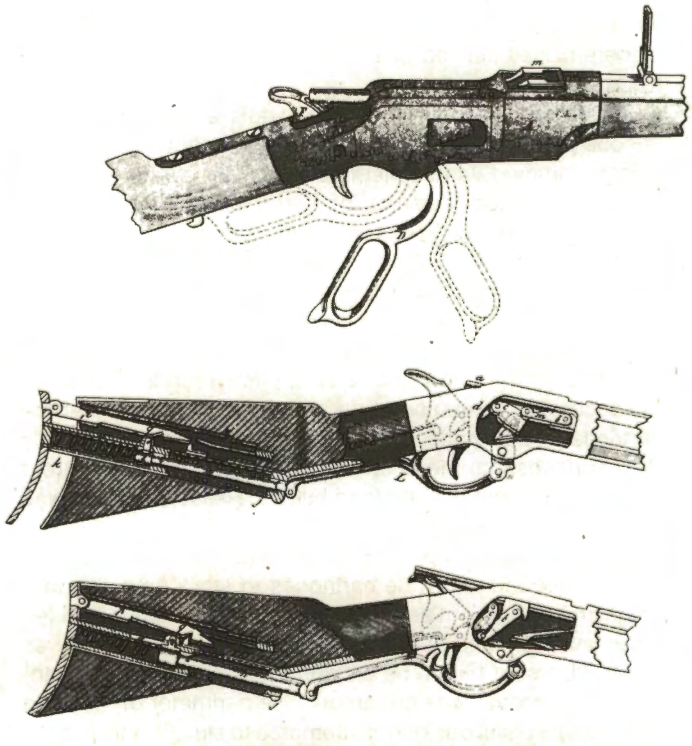


FIGURE 3–1. Hiram Maxim's first idea for a self-loading firearm, the modified Winchester Model 1866 rifle. (*Smith*)

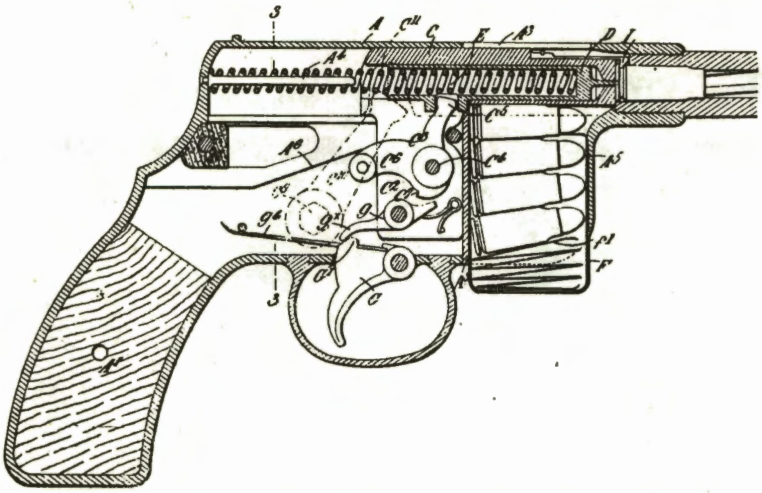


FIGURE 3–2. An early self-loading pistol design proposed by Maxim, from Maxim's autobiography, *My Life* (1915). (*Maxim*)

Winchester, beginning a very important career in weapons design. Although Maxim concentrated on creating machine guns, he gave passing attention to the idea of self-loading pistols, too. In *My Life,* Maxim's autobiography, he talked briefly about applying the self-loading principle to handguns.

> When I had perfected my gun in Europe I wrote to all the prominent gun and pistol makers in the United States telling them that the automatic system would soon be applied to firearms of all sizes from pocket-pistols up, and advising them to work my system, which had been broadly patented in the States. I did not receive a single favorable reply, in fact, I might say that the replies were scurrilous—they ridiculed the idea: but at the present time [1915] I think every maker of firearms in America is using the automatic system. The patents, however, have expired.[2]

Sounding like the inventor scorned, Maxim appears rather naive. His suggestion for creating a self-loading pistol must have seemed either premature or terribly vague to American arms manufacturers of that period. In addition Maxim should have realized that these men responded more positively to ideas of steel rather than ideas on paper. Designers who wanted consideration had to submit shooting examples of their hardware.

The one Maxim self-loading pistol design was apparently the work of another designer with whom Maxim cosponsored and copatented the handgun. On 28 December 1896, Hiram Maxim and Louis Silverman received British patent 29,896 for a plain blowback-type pistol. In his autobiography, Maxim does not mention this design or any other project with which Silverman assisted.* Some experts theorize that the so-called Maxim pistol was the work of Silverman, one of a band of inventors whose name has been forgotten, since he was not a self-promoter like Colt, Adams, and Maxim.

The Silverman-Maxim pistol was an interesting design, even if it was only made in prototype form. The receiver, trigger guard, and pistol grip were all milled from a single piece of steel, and there were only four reciprocating parts with one spring and three pins. Added to this were the sear, trigger and trigger spring, extractor, barrel, and magazine. With these few parts, this pistol was one of the simplest ever created. The bolt was a light, hollow cylinder, which reciprocated in the tubular receiver. Detonation of the primer was accomplished by the release of a striker housed in the bolt, which was held in place by a bushing that was screwed into the rear end of the receiver. A cocking knob at the end of the receiver allowed the shooter to retract the bolt and cock the striker. A single spring acted both as the mainspring for the striker and as the recoil spring for the bolt. A collar on the forward portion of the striker held the spring in place and served as the surface against which the sear rode when the handgun was cocked. The sear was a simple, flat piece pivoted by a pin.

To fire the Silverman-Maxim pistol, the trigger was pulled, bringing a projection on the trigger to bear against the forward end of the sear. As the sear pivoted, the striker was freed to travel forward and strike the primer of the cartridge. The striker could be cocked by drawing back on the cocking piece. If the cocking piece was pulled completely to the rear, the bolt was also be retracted. A dust cover plate reciprocated with the bolt; so when the bolt was closed, the dust cover was also closed so as to prevent dirt from entering the pistol's mechanism.

By any standard, this was a very modern design, and the pistol was very comfortable to hold. Surviving examples are chambered for the 7.65mm Borchardt, 8mm Schönberger, and .455 (11.5mm) Webley pistol cartridges, the latter being the rimmed revolver type. The use of these relatively high-powered cartridges in a simple blowback pistol must account for the two gas ports on either side of the pistol. By allowing some of the gas to escape around the cartridge case, the designers solved the problem of the case binding in the chamber while pressures were still high—blowback pistols tend to open prematurely—by reducing the pressures acting on the bolt as it recoiled. Although no written accounts exist of test-firing this pistol, it is quite likely that the position of the gas ports gave shooters some unpleasant blasts of gas when they fired the weapon. It is still a remarkable design for its

*Maxim and Silverman shared at least four other United States patents related to machine guns.

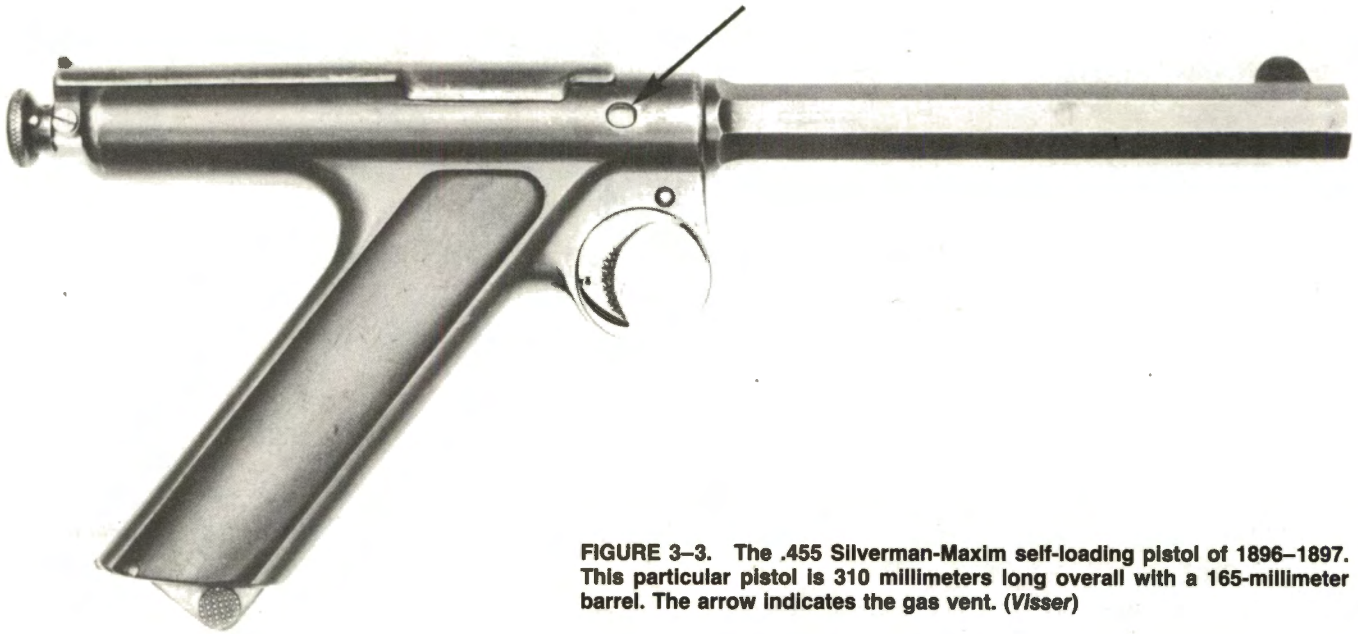


FIGURE 3–3. The .455 Silverman-Maxim self-loading pistol of 1896–1897. This particular pistol is 310 millimeters long overall with a 165-millimeter barrel. The arrow indicates the gas vent. (*Visser*)

FIGURE 3–4. A 7.65mm Borchardt caliber Silverman-Maxim self-loading pistol. It is almost exactly the same size as the .455 caliber model. Neither has a serial number. (*Visser*)

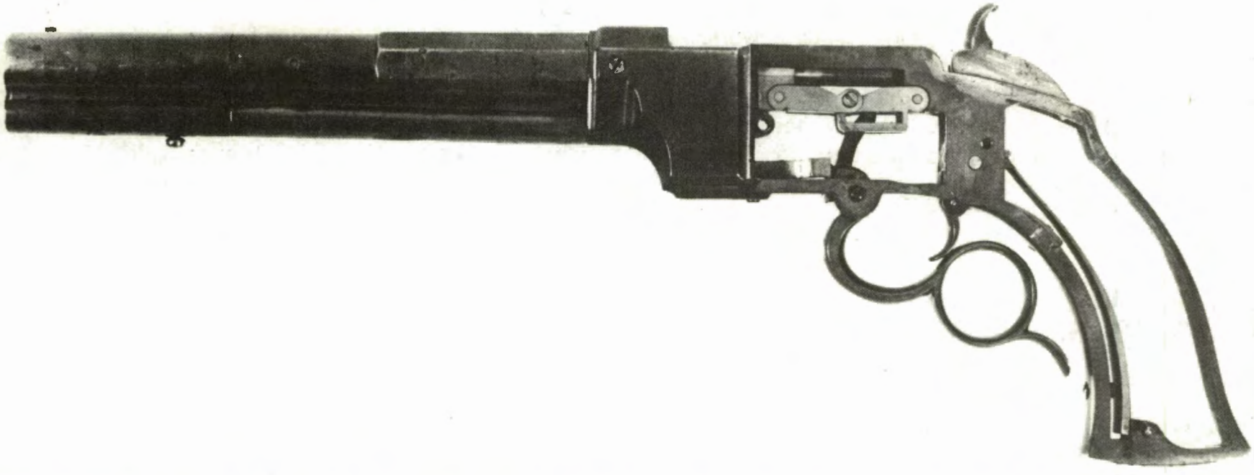
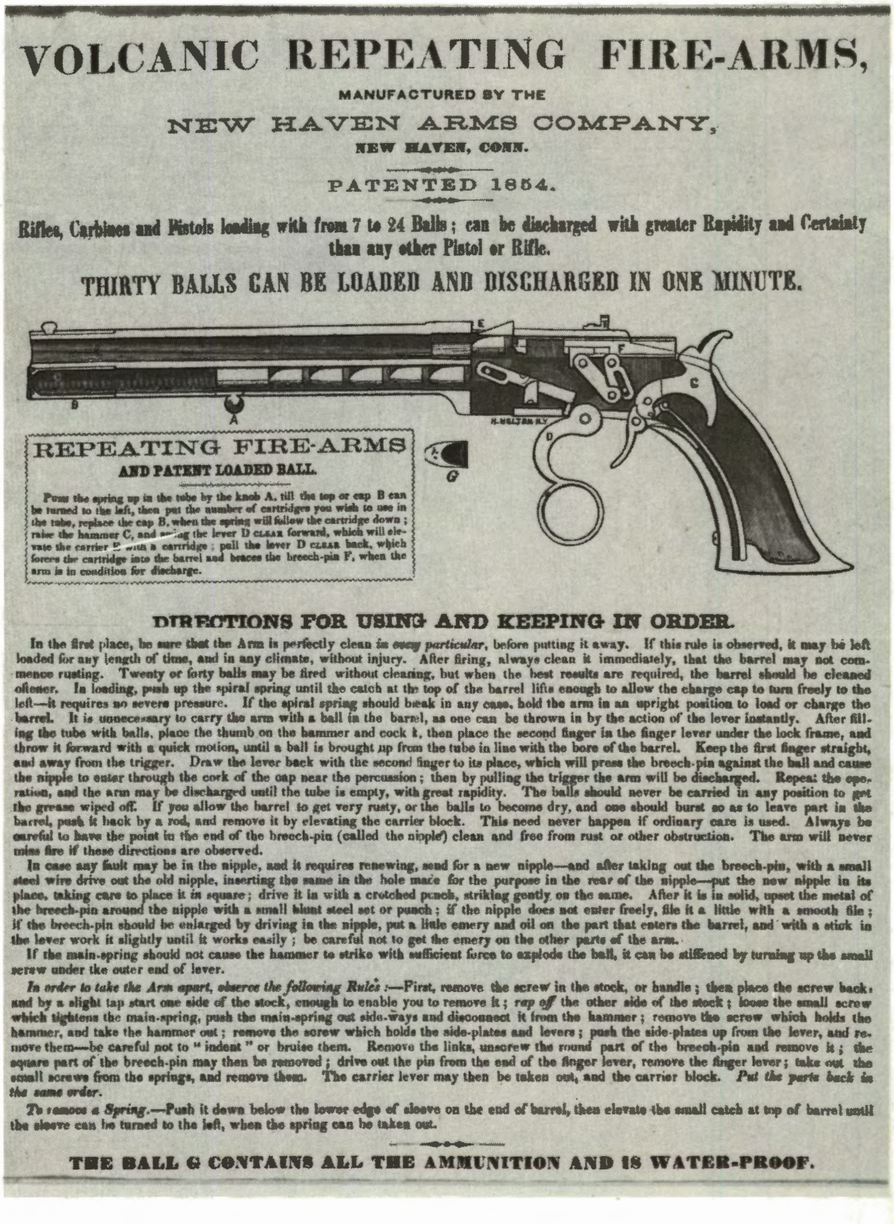


FIGURE 3–5. The Volcanic mechanical repeating pistol. In this particular example, the side plates and grips have been removed to expose the operating mechanism. (*Smithsonian*)



VOLCANIC REPEATING FIRE-ARMS,

MANUFACTURED BY THE

NEW HAVEN ARMS COMPANY,

NEW HAVEN, CONN.

PATENTED 1854.

Rifles, Carbines and Pistols loading with from 7 to 24 Balls; can be discharged with greater Rapidity and Certainty than any other Pistol or Rifle.

THIRTY BALLS CAN BE LOADED AND DISCHARGED IN ONE MINUTE.

REPEATING FIRE-ARMS

AND PATENT LOADED BALL.

Push the spring up in the tube by the knob A, till the top or cap B can be turned to the left, then put the number of cartridges you wish to use in the tube, replace the cap B, when the spring will follow the cartridge down; raise the hammer C, and swing the lever D CLEAR forward, which will elevate the carrier E with a cartridge; pull the lever D CLEAR back, which forces the cartridge into the barrel and braces the breech-pin F, when the arm is in condition for discharge.

DIRECTIONS FOR USING AND KEEPING IN ORDER.

In the first place, be sure that the Arm is perfectly clean *in every particular*, before putting it away. If this rule is observed, it may be left loaded for any length of time, and in any climate, without injury. After firing, always clean it immediately, that the barrel may not commence rusting. Twenty or forty balls may be fired without cleaning, but when the best results are required, the barrel should be cleaned oftener. In loading, push up the spiral spring until the catch at the top of the barrel lifts enough to allow the charge cap to turn freely to the left—it requires no severe pressure. If the spiral spring should break in any case, hold the arm in an upright position to load or charge the barrel. It is unnecessary to carry the arm with a ball in the barrel, as one can be thrown in by the action of the lever instantly. After filling the tube with balls, place the thumb on the hammer and cock it, then place the second finger in the finger lever under the lock frame, and throw it forward with a quick motion, until a ball is brought up from the tube in line with the bore of the barrel. Keep the first finger straight, and away from the trigger. Draw the lever back with the second finger to its place, which will press the breech-pin against the ball and cause the nipple to enter through the cork of the cap near the percussion; then by pulling the trigger the arm will be discharged. Repeat the operation, and the arm may be discharged until the tube is empty, with great rapidity. The balls should never be carried in any position to get the grease wiped off. If you allow the barrel to get very rusty, or the balls to become dry, and one should burst so as to leave part in the barrel, push it back by a rod, and remove it by elevating the carrier block. This need never happen if ordinary care is used. Always be careful to have the point in the end of the breech-pin (called the nipple) clean and free from rust or other obstruction. The arm will never miss fire if these directions are observed.

In case any fault may be in the nipple, and it requires renewing, send for a new nipple—and after taking out the breech-pin, with a small steel wire drive out the old nipple, inserting the same in the hole made for the purpose in the *rear* of the nipple—put the new nipple in its place, taking care to place it *in* square; drive it in with a crotched punch, striking gently on the same. After it is in solid, upset the metal of the breech-pin around the nipple with a small blunt steel set or punch; if the nipple does not enter freely, file it a little with a smooth file; if the breech-pin should be enlarged by driving in the nipple, put a little emery and oil on the part that enters the barrel, and with a stick in the lever work it slightly until it works easily; be careful not to get the emery on the other parts of the arm.

If the main-spring should not cause the hammer to strike with sufficient force to explode the ball, it can be stiffened by turning up the small screw under the outer end of lever.

In order to take the Arm apart, observe the following Rules:—First, remove the screw in the stock, or handle; then place the screw back, and by a slight tap start one side of the stock, enough to enable you to remove it; *rap off* the other side of the stock; loose the small screw which tightens the main-spring, push the main-spring out side-ways and disconnect it from the hammer; remove the screw which holds the hammer, and take the hammer out; remove the screw which holds the side-plates and levers; push the side-plates up from the lever, and remove them—be careful not to "indent" or bruise them. Remove the links, unscrew the round part of the breech-pin and remove it; the square part of the breech-pin may then be removed; drive out the pin from the end of the finger lever, remove the finger lever; take out the small screws from the springs, and remove them. The carrier lever may then be taken out, and the carrier block. *Put the parts back in the same order.*

To remove a Spring.—Push it down below the lower edge of sleeve on the end of barrel, then elevate the small catch at top of barrel until the sleeve can be turned to the left, when the spring can be taken out.

THE BALL G CONTAINS ALL THE AMMUNITION AND IS WATER-PROOF.

FIGURE 3–6. Company broadside advertisement for the Volcanic pistol. (*Smithsonian*)

time and considerably simpler than some of the later pistols that were tested and adopted by major military powers.[3]

Several designers applied the self-loading concept to handguns. Eight years after Maxim patented his first self-loader, Joseph Laumann of Austro-Hungary received letters of patent for a handgun that made the transition from mechanical repeater to self-actuator.

MECHANICAL REPEATING PISTOLS—TRANSITIONAL ARMS

As with early attempts at producing revolving firearms, the initial attempts to create mechanical repeaters came before the corresponding level of manufacturing could support the ideas. Claude Blair and R. K. Wilson document some of these early experiments in their books.[4] None of these, dating from as early as 1640, was of significance to the later evolution of self-loaders, but they do indicate a long-standing desire for an improved means of loading handguns. The first pistol of real importance to this story was the *volitional pistol,* manufactured first by Horace Smith and Daniel Wesson during their first partnership and then by Volcanic Repeating Arms Company in the mid-1850s. Stemming from the rifle design work of Lewis Jennings and the cartridge experiments of Walter Hunt, the Volcanic pistol, as it is commonly called, was fitted with a tubular spring-powered magazine located beneath the barrel into which loaded ammunition was inserted. The breech bolt was operated by a lever that also served as the trigger guard. When the lever was arced down and toward the muzzle, a breech pin was moved to the rear. At the same time, the ammunition lifter was elevated so that the breech piece could drive the ammunition forward on the closing stroke.* A blunt projection on the breech piece det-

*Ammunition is used here because the Volcanic-type pistols had the powder and detonator housed in the base of the projectile; there was no cartridge case.

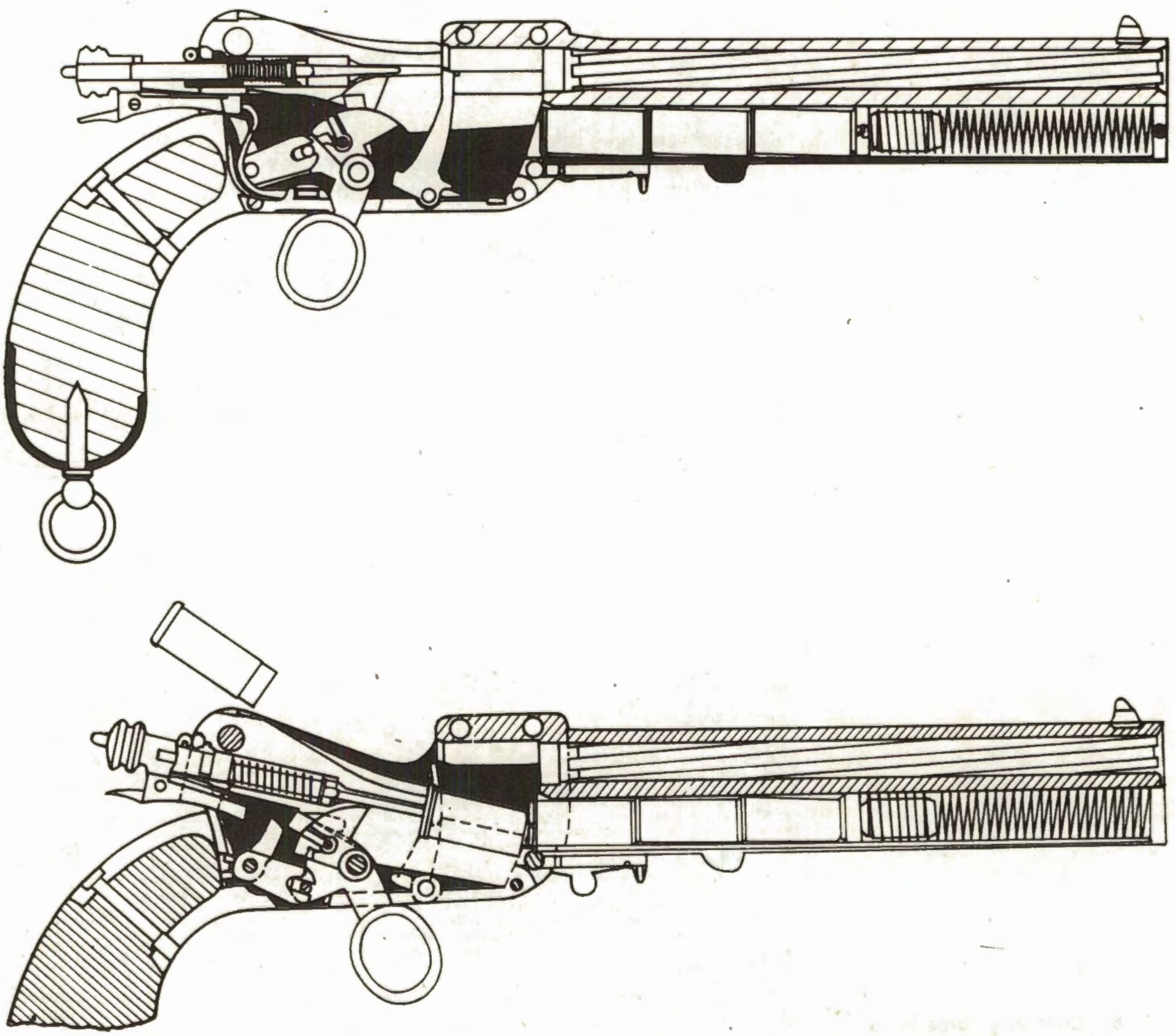


FIGURE 3–7. The Rudolf Österreich mechanical repeating pistol of 1884. (*Lugs*)

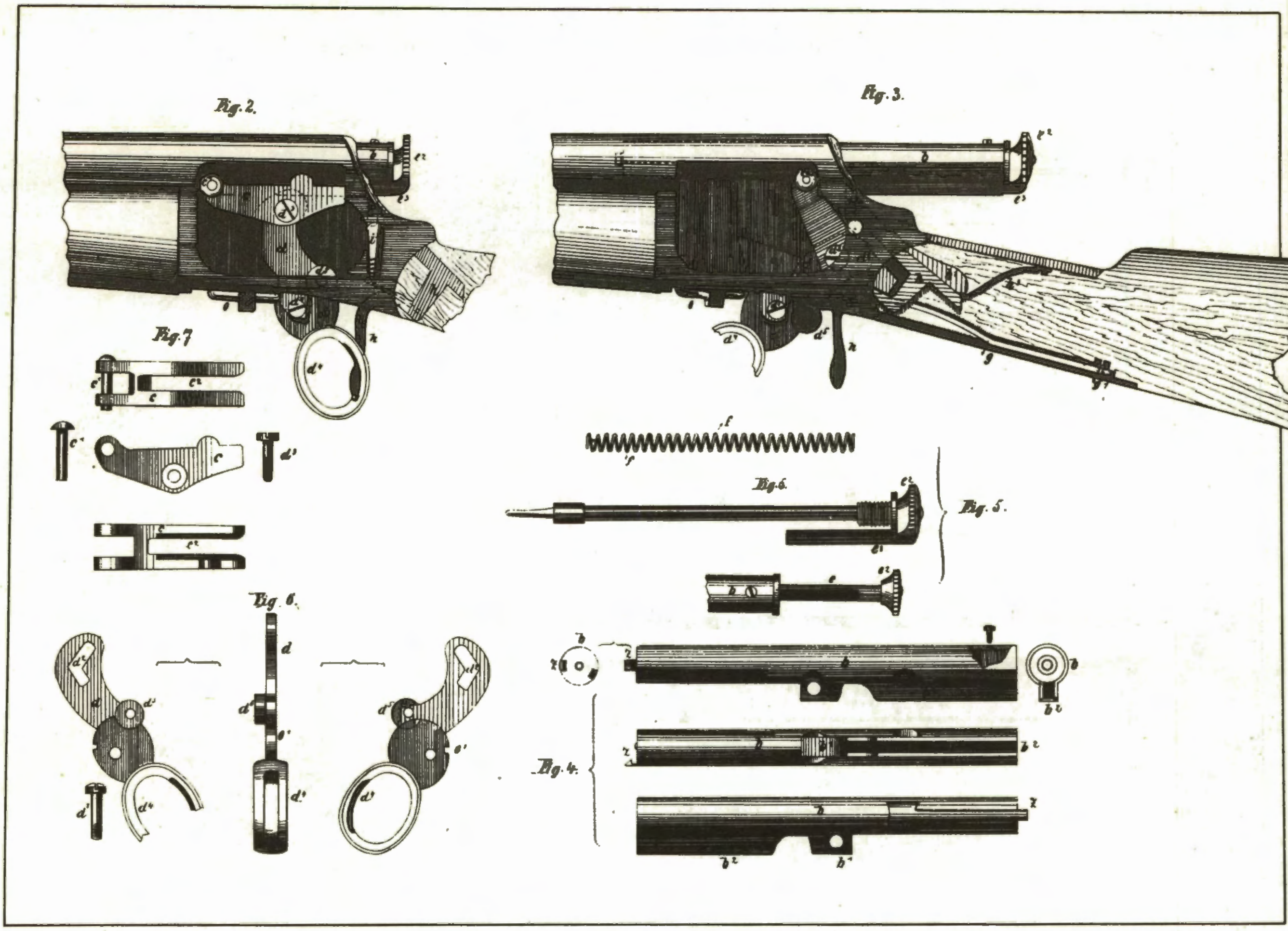


FIGURE 3–8. The Schulhof repeating mechanical rifle is mechanically very similar to the Schulhof pistol. (*U.S. Army*)

FIGURE 3–9. The Schulhof 8mm Model 1894 repeating mechanical pistol, a six-shot pistol, was operated by the ring lever. The cartridges were loaded through the gate, shown open in this photograph; the cartridges were housed in the grip. (*Hogg and Weeks*)

ex D. R. P. 38007.

Schnelladeeinrichtung für Handfeuerwaffen mit Blockverschluss.

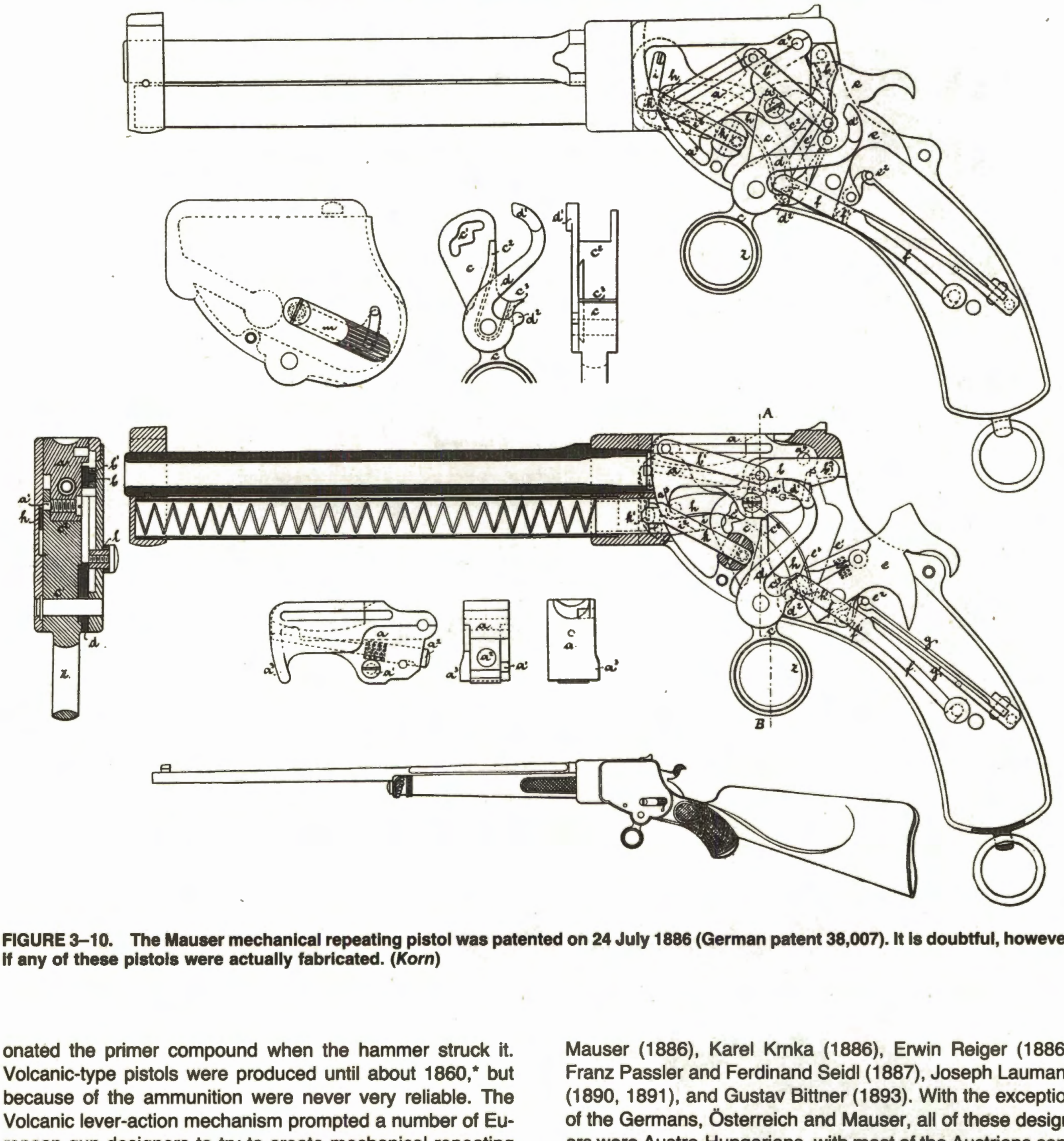


FIGURE 3–10. The Mauser mechanical repeating pistol was patented on 24 July 1886 (German patent 38,007). It is doubtful, however, if any of these pistols were actually fabricated. (*Korn*)

onated the primer compound when the hammer struck it. Volcanic-type pistols were produced until about 1860,* but because of the ammunition were never very reliable. The Volcanic lever-action mechanism prompted a number of European gun designers to try to create mechanical repeating pistols. Nearly all of these mechanical repeaters operated by pushing the trigger guard forward.[5]

Several of these early mechanical repeating pistols merit passing reference. Rudolf Österreich patented a mechanical repeater in 1884, followed by Josef Schulhof (1884), Paul Mauser (1886), Karel Krnka (1886), Erwin Reiger (1886), Franz Passler and Ferdinand Seidl (1887), Joseph Laumann (1890, 1891), and Gustav Bittner (1893). With the exception of the Germans, Österreich and Mauser, all of these designers were Austro-Hungarians, with most of the Austrians coming from Bohemia, later part of Czechoslovakia. Their mechanical repeaters were never commercially successful because of the appearance of a truly self-operating pistol on the market.

*Oliver F. Winchester (1810–1880) took over the Volcanic Arms Co. when it became insolvent in March 1857. Winchester's New Haven Arms Co., created in 1857, produced the Volcanic pistol for several more years. In 1860, he brought out a rifle based on the Volcanic lever-action mechanism that fired the .44 (11.17mm) caliber Henry cartridge. The Henry rifle line would make the name Winchester famous around the world.

A PRACTICAL SELF-LOADER

The Search Begins

Joseph Laumann, an obscure Austrian designer, went one step beyond the mechanical repeater. His name, however, is not generally associated with his self-loader because the patent was probably signed over to the Gebruder Schönberger company of Vienna, as were his other patents. Who the Schönberger brothers were and what their relationship to Laumann was is uncertain, but it is likely that the Schönbergers were associated with the Österreichische Waffenfabrik Gesellschaft at Steyr in northern Austria where the Schönberger pistol was manufactured. This factory, which played an important role in the history of self-loading pistols, was established in 1835 by Leopold Werndl, and prospered under his son Josef. Generally referred to by the name of the river on which it was located, the *Steyr* factory was a joint stock company that produced small arms for a variety of customers—the Austro-Hungarian government, Prussia, Romania, Persia, Montenegro, China, and Chile. From 1867 until the start of World War I, the Steyr works produced more than 6 million military rifles, more than 250,000 pistols of various types, and some 20,000 sporting rifles. In 1892 with about 5,500 employees capable of making 8,000 rifles per week, Steyr entered the self-loading pistol business with the Schönberger-Laumann design. Although the pistol was not a commercial success, it opened the door for the Österreichische Waffenfabrik's subsequent promotion of the Mannlicher pistols.

Laumann's self-loading pistol is of interest primarily because of its method of actuation. It belonged to that class of locked-breech firearms that was operated by the rearward movement of the cartridge case primer after it had been detonated. The essential component of this system was a breech mechanism that was locked to the fixed barrel at the moment of firing. As the propellant gases expanded in the barrel, the pressure drove the projectile down the barrel towards the muzzle. At the breech end, the pressure drove the primer out of its seat. This required a special primer with a very deep pocket that could move to the rear and push the striker, but not move so far that the primer could fall out of its pocket and jam the pistol's mechanism.

The bolt (breech-piece) of this pistol was connected by a swivel (bolt link) to a long, forked lever, which had its pivot point immediately in front of the trigger. The bolt swivel had a camming surface at its rear end that engaged a projection on the receiver housing (frame). A stud on the swivel engaged the fork at the top of the lever. A cocking lever mounted on the right side of the pistol and connected to the lever on the inside of the handgun did not move when the weapon was fired. When the cocking lever was rotated to the rear, the swivel was pushed back against the cam surface in the receiver, allowing the bolt to slide back. At its rearmost position, the cocking lever tripped a transverse lever at the back of the frame to hold the bolt in the recoiled position. Pressing down on the lever released the bolt so that it could be propelled forward by its spring. At the moment of primer detonation, the swivel was locked in its forward position by a shoulder on the striker. As the gas built up, the locked breech kept the cartridge from being propelled to the rear, but the primer was

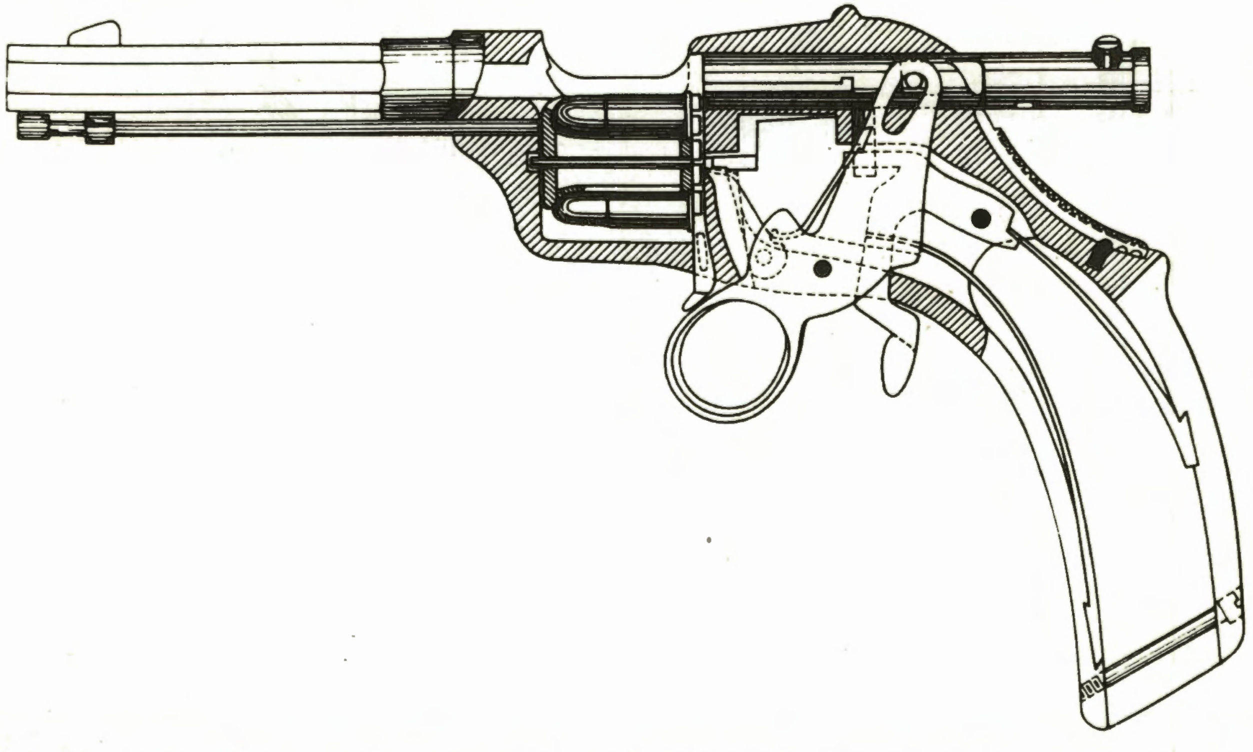


FIGURE 3–11. The 1886 Krnka mechanical repeating pistol had a six-shot rotary magazine, which was loaded through the right side. A pistol of this pattern was displayed by Karel Krnka at the National Jubilee Exhibition held at Prague in 1891. As illustrated, it fired a 5.1mm cartridge. (*Hogg and Weeks*)

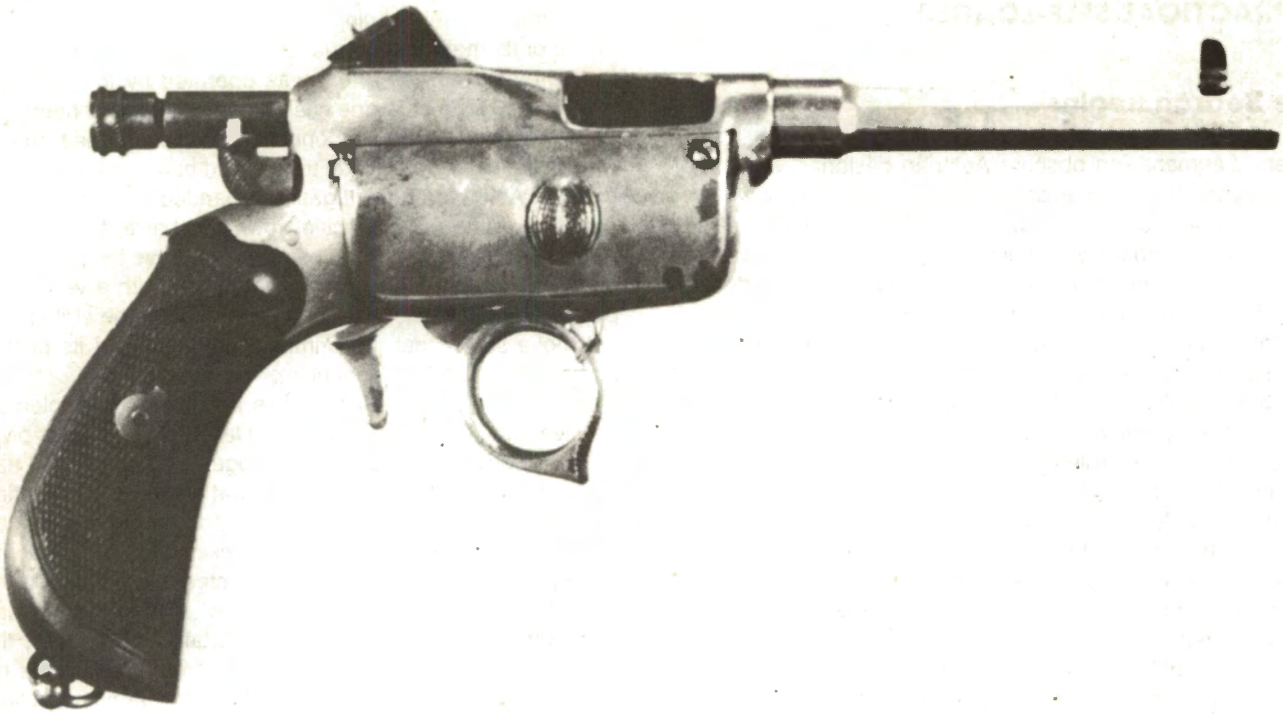


FIGURE 3–12. The Reiger mechanical repeating pistol of 1886 received a British patent in 1889 (6,300). The side cover slides to the rear to expose a rotary magazine. (*Labbett*)

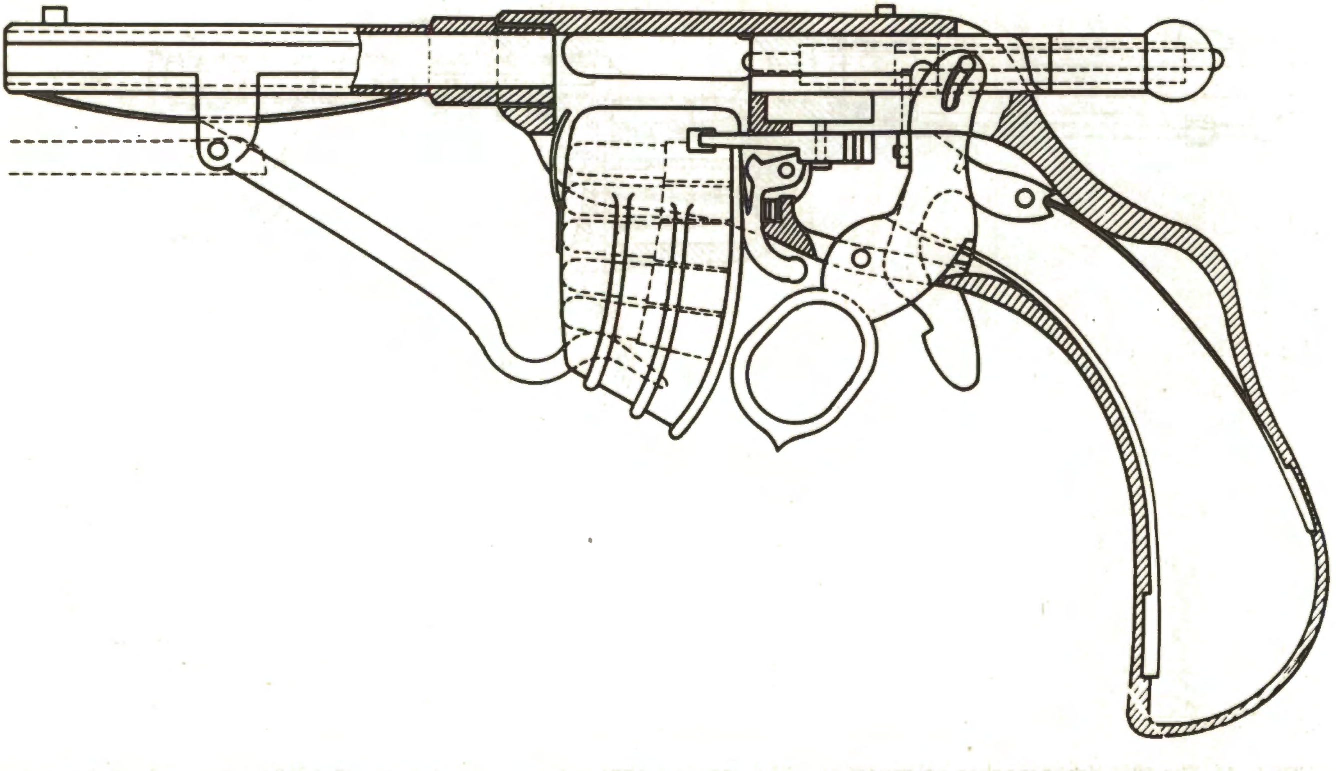


FIGURE 3–13. The 1887 Passler and Seidl magazine repeating pistol fired five 7mm cartridges from a clip. Note the external follower mechanism that pushed the cartridges upward. (*Hogg and Weeks*)

FIGURE 3–14. The 7.7mm Bittner 1893 magazine repeating pistol, evolved from the Passler and Seidl, was fabricated by Gustav Bittner of Weipert, Bohemia. This pistol is 300 millimeters long overall, with a 153-millimeter barrel. It apparently was the most widely distributed of the European mechanical repeaters. (*Krcma*)

free to move. The primer pushed the striker as it moved to the rear, and the shoulder on the striker unlocked the swivel when it struck it. As the bullet neared the end of its travel down the barrel, the bolt was no longer locked and thus it accelerated to the rear. Primary extraction of the cartridge case occurred as the breech was unlocked, and the spent round was ejected at the end of the recoil stroke. On the return stroke, the bolt stripped a loaded cartridge into the chamber.

The Schönberger-Laumann pistol fired an 8 × 25mm cartridge, which may have been of the rimmed variety. R. K. Wilson, an early expert on self-loading pistols, hypothesized that the pistol fired a 7.5-gram projectile at an initial velocity of about 365 meters per second. Specimens of this cartridge

FIGURE 3–15. This 7mm Bittner pistol has the side plate removed to expose the linkage between the bolt and the lever. (*Musée d'Armes Liège*)

FIGURE 3–16. A group of three Belgian mechanical repeating pistols with their operating mechanisms exposed. The top pistol is P. H. Counet's patent; the other two are unidentified. (*Musée d'Armes Liège*)

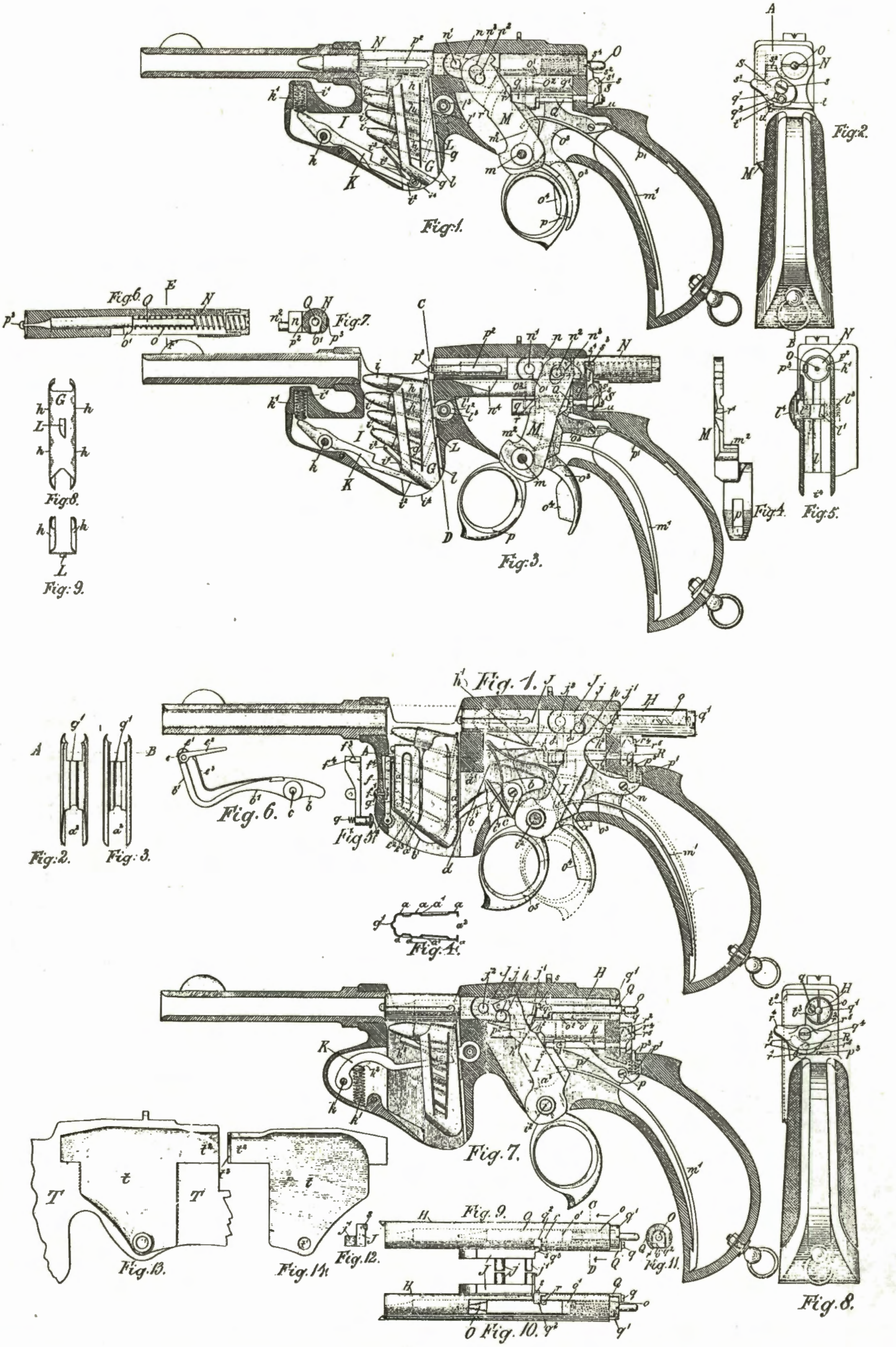
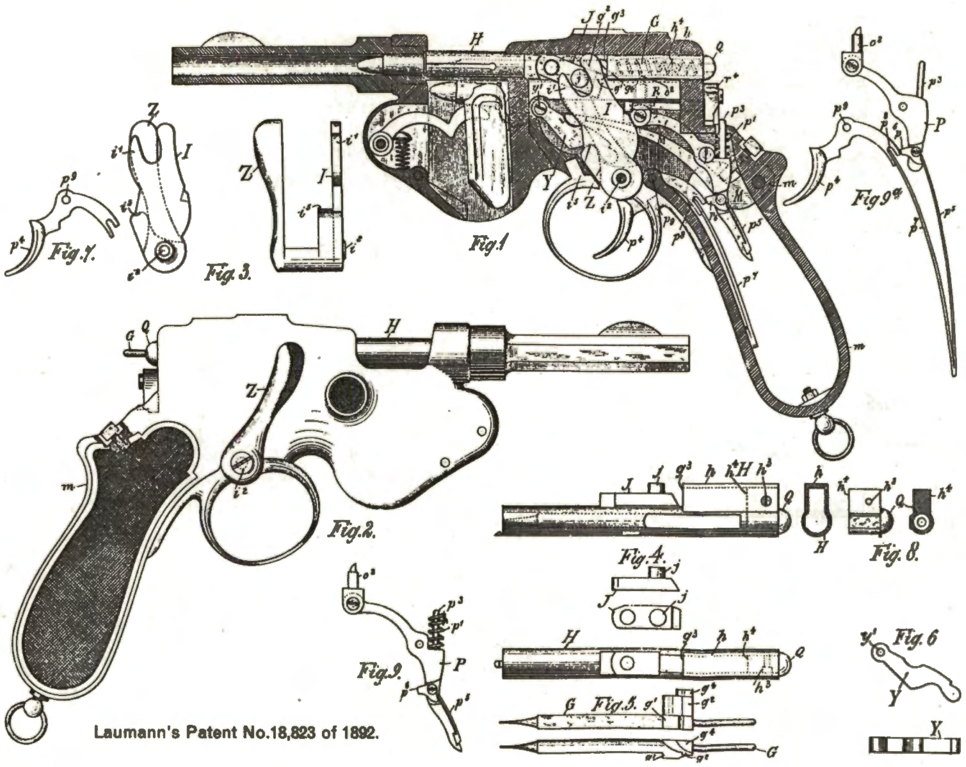
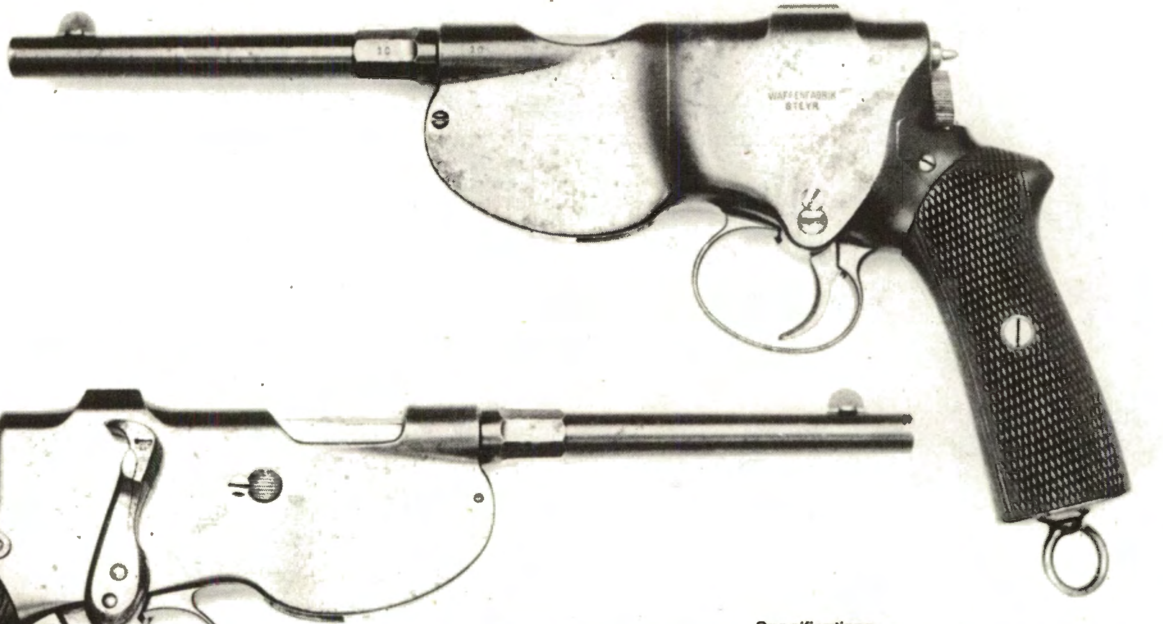
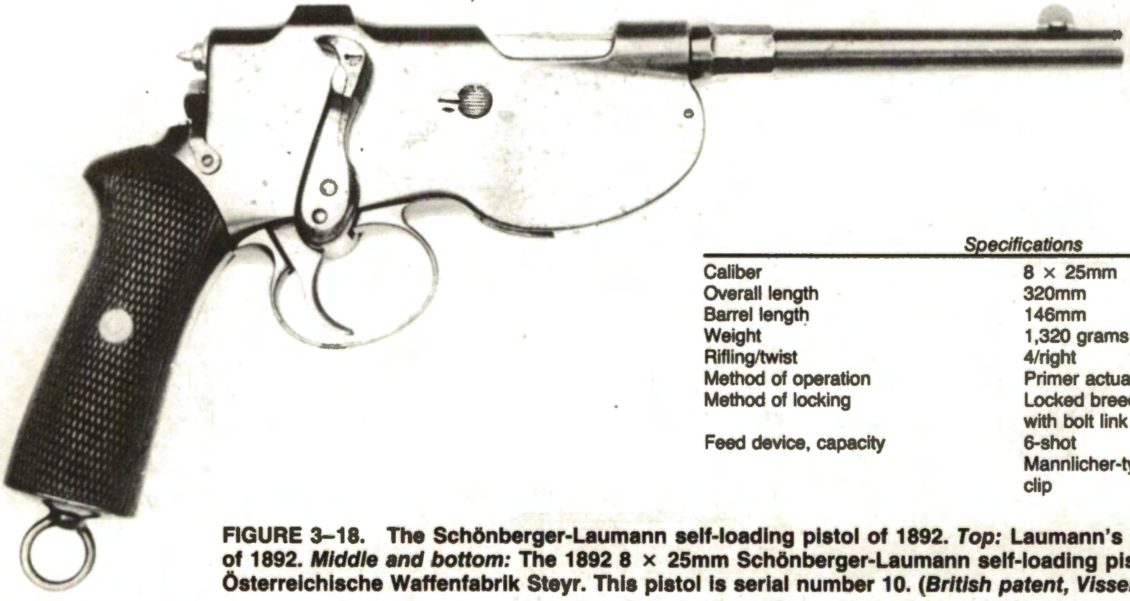


FIGURE 3–17. The Laumann patents for mechanical repeating pistols. *Top* is the drawing from British patent 3,790 of 1890; *bottom* is from British patent 2,984 of 1891. (*British patent*)







Specifications	
Caliber	8 × 25mm
Overall length	320mm
Barrel length	146mm
Weight	1,320 grams
Rifling/twist	4/right
Method of operation	Primer actuation
Method of locking	Locked breech with bolt link
Feed device, capacity	6-shot Mannlicher-type clip

FIGURE 3–18. The Schönberger-Laumann self-loading pistol of 1892. *Top:* Laumann's British patent 18,823 of 1892. *Middle and bottom:* The 1892 8 × 25mm Schönberger-Laumann self-loading pistol manufactured by Österreichische Waffenfabrik Steyr. This pistol is serial number 10. (*British patent, Visser*)

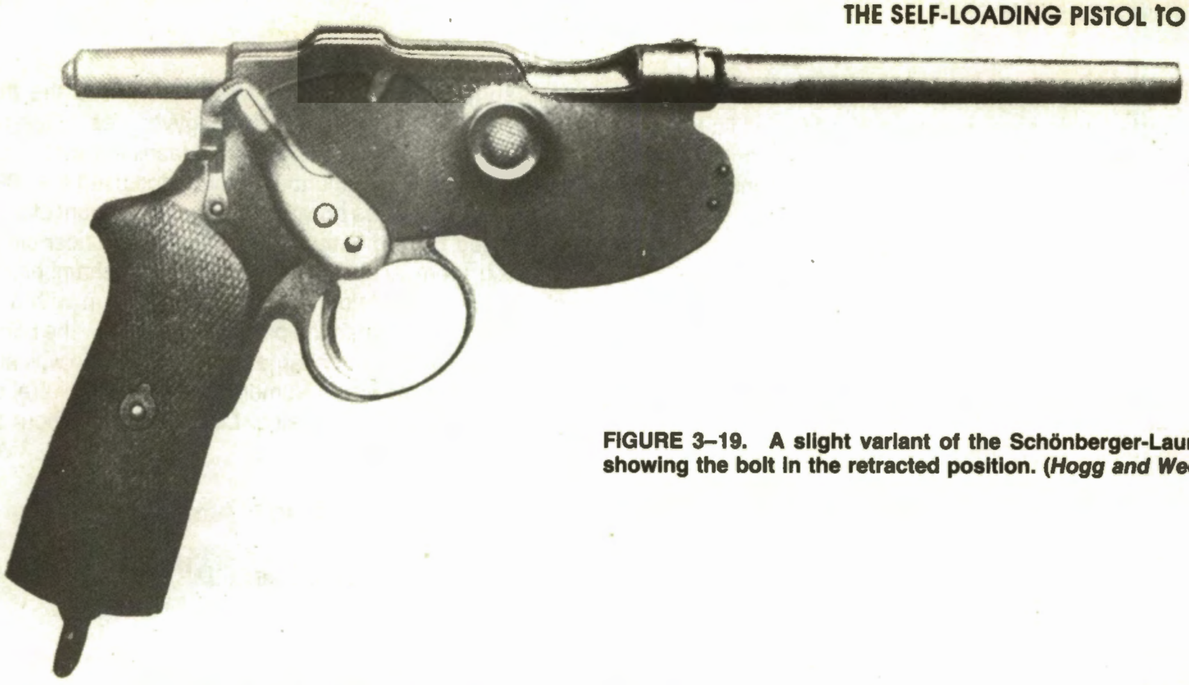


FIGURE 3–19. A slight variant of the Schönberger-Laumann pistol showing the bolt in the retracted position. (*Hogg and Weeks*)

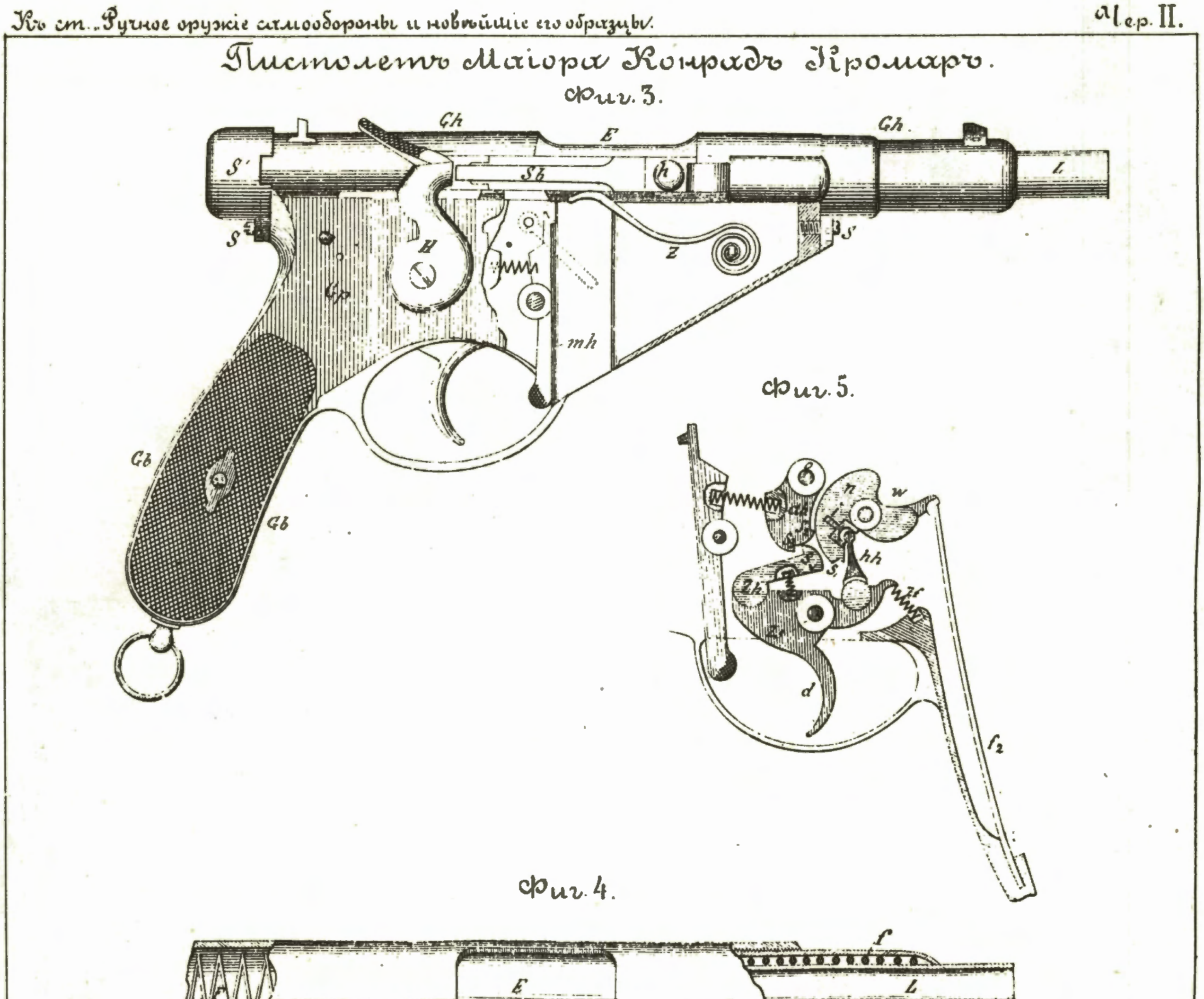


FIGURE 3–20. An early Russian illustration of Konrad von Kromar's self-loading pistol. Note the Schönberger-type cocking lever and the recoiling barrel. This pistol is a very close relative of the earlier mechanical repeating pistols. (*Sotamuseo*)

are extremely rare, as are samples of the pistol. Wilson reported on a matched pair, serial numbers 8 and 9, and figure 3–16 shows number 10. The Schönberger-Laumann was beautifully made, with an attractive, case-hardened finish on the receiver.[6]

In Austrian pistol trials held in either 1894 or 1895, the Schönberger was pitted against three other self-loaders and an 8mm revolver, possibly a prototype of the Rast & Gasser. One of the self-loaders was designed by Archduke Karl Salvator (d. 1892) and Georg von Dormus (codesigners of the Mittrailleuse M. 13 produced at the Škoda Works in Plzěn); one was the work of Konrad von Kromar (better known for his biography of Ferdinand von Mannlicher), and the third was the contribution of the Fegyver és Gépgyár Részvénytársaság (Small Arms and Machine Factory Co. Ltd.) of Budapest. The Schönberger cartridge used the 1892-type Austrian smokeless powder with a small amount of black powder added to help ignite it. The result was uncertain ignition (hang fires) and fouling of the pistol's chamber and barrel. The Dormus pistol, an 8mm five-shot gun with a recoiling barrel that actuated the operating rod below the barrel, used a smokeless powder charge in which Ballistite was substituted for black powder. Numerous hang fires were encountered with this mixture also. Little is known about the

FIGURE 3–21. The 1894 Salvator-Dormus 8mm self-loading pistol, with an arrow indicating the operating handle and the direction it is moved to cock and discharge the weapon. (*Visser*)

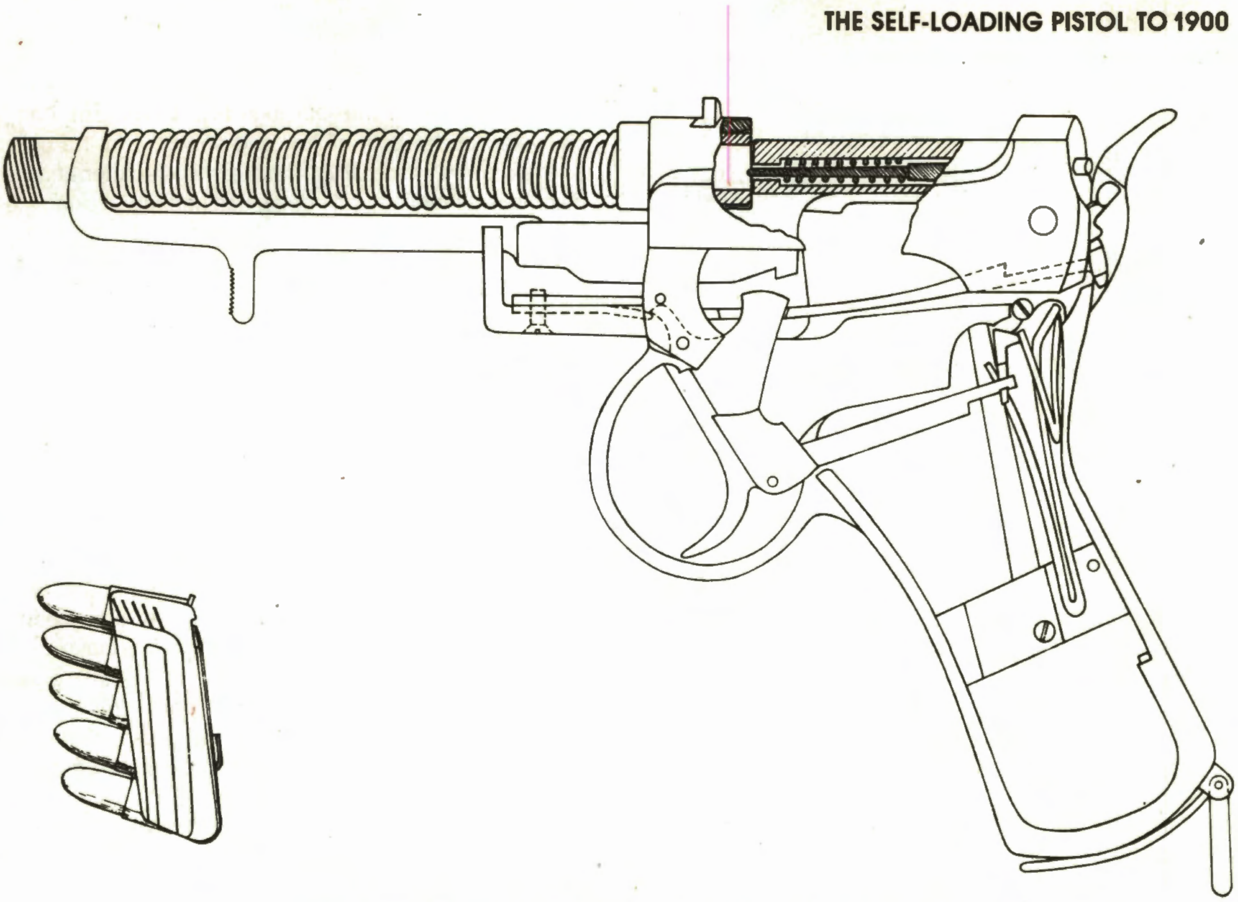


FIGURE 3–22. Sectional view of the 1894 Salvator-Dormus. (*Lugs*)

weapon submitted by the factory from Budapest (perhaps it was an early version of designer Georges Fromer's pistol). It had a recoiling barrel and fired 8mm cartridges, as did von Kromar's pistol. Neither of these handguns performed very reliably. Unfortunately for the designers, this early trial demonstrated that self-loading pistols required much more work before they could be viewed as anything more than curiosities.[7]

Despite the faltering steps taken by early designers, several excellent weapon designs emerged by the end of the century. Hugo Borchardt, Andreas Wilhelm Schwarzlose, Paul Mauser, John M. Browning, Theodor Bergmann, and Ferdinand Ritter von Mannlicher all introduced promising self-loading pistol prototypes by 1900. As the Borchardt, Mauser, Browning, Bergmann, and Mannlicher pistols will be discussed in detail in later chapters, they are mentioned here only in passing. There are also several less successful but technically interesting pistols that merit attention.

Andreas Wilhelm Schwarzlose (1867–1936), born in the Berlin suburb of Charlottenberg, carried out all of his experimental and manufacturing activities in a Berlin-based factory. While his name is most frequently recognized in connection with the Schwarzlose machine gun that was used by the Austro-Hungarian armed forces, his earliest experiments centered on self-loading pistols. From his work, the shift from an essentially self-actuated mechanical repeater to a very modern self-loading pistol can be seen. This evolution of ideas took only six years (1892–1898).

The first Schwarzlose self-loader was a strange and awkward design, reminiscent of the contemporary mechanical repeaters. Its breech mechanism was similar in concept to the Remington rolling-block pistols and rifles, with the breech-piece and hammer mounted on the same axial pin, but in Schwarzlose's design the rolling block was actuated by the recoiling barrel. Upon firing, the barrel recoiled a short distance and drove the breech-piece and hammer to the rear. As they rotated on a common axis pin, the breech-piece actuated a lifter that brought the next cartridge into line for feeding into the chamber. On the return (loading) stroke, the breech-piece drove the cartridge into the chamber, and the hammer remained at the rear in the cocked position. This pistol apparently fired a straight-cased 8mm cartridge with a rim of the type commonly used in revolvers. The only reported specimen of this handgun disappeared from the Musee d'Armes de Liège during the Second World War.[8]

Schwarzlose's second self-loader was patented in 1894 (Deutsches Reich patent 93,213; British patent 9,490, 14 May 1895), but it seemingly never got beyond the drafting table. He proposed a long recoiling system, a ring-type trigger (without trigger guard), and a lever-operated cocking system that would have allowed cocking with one hand, essential for mounted cavalry personnel. Locking would have been accomplished by the rotation of the barrel and the breech housing, while the breech-piece moved to the rear without any rotational motion. While it is not known why he abandoned this pistol or if there were others that he worked on but did not bother to patent, Schwarzlose had by 1898 arrived at a successful design.

The Schwarzlose Standart, or military model (British patent 1,934, 23 April 1898), was not only quite modern in appearance by mid-twentieth century standards but also very advanced in concept. It is of technical interest because of its

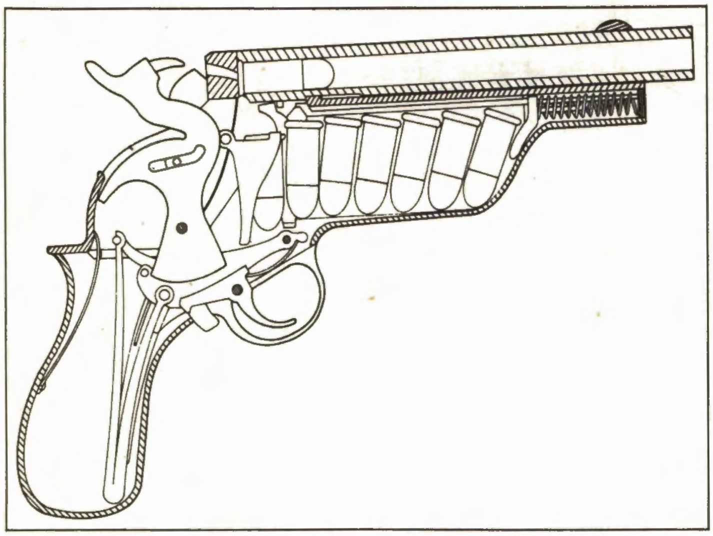


FIGURE 3–23. The Schwarzlose 8mm self-loading pistol patented in 1892. (*Hogg*)

rotary-locked breech mechanism, which consisted of three main assemblies—barrel and barrel extension, bolt, and frame (receiver). Barrel and barrel extension were machined from a single piece. Below the octagonal *reinforce* section of the barrel, there was a rectangular section that rode in a track in the frame and housed the barrel return spring. The barrel extension was at the breech end of the barrel, which was cut to receive the four lugs of the bolt. The bolt group consisted of the bolt, striker and spring, and the one-piece sear extractor. About 25 millimeters in diameter at its largest point, this essentially cylindrical bolt had four locking lugs that matched the locking recesses in the barrel extension. At the rear of the bolt were two wings that were used to retract it. The interior of the bolt had been bored out to an interior diameter of 17.5 millimeters, which resulted in a relatively light weight and provided room for the striker and the combination striker-recoil spring. On the bottom of the bolt was a slot, helical at the rear for about 25 millimeters and then straight for 50 millimeters, that provided the necessary rotation for the bolt to unlock it from the barrel extension. The striker was a very large piece, 120 millimeters long, which in the cocked position was held to the rear by the combination sear-extractor, a right-angled bell crank lever that floated in a vertical slot in the forward portion of the striker when the bolt and striker were moving. The receiver group housed all the nonreciprocating parts of the pistol. It is noteworthy that Schwarzlose included only four springs in this pistol—the receiver-mounted magazine catch spring, the barrel return spring, the bolt-striker spring, and the back sight spring. Rotation of the bolt was accomplished by the cam slot on the bolt moving along a cam-receiver ring at the rear of the receiver. That ring rode inside the bolt while its rectangular stalk guided the cam slot in the bolt.

Whereas the barrel and breech extension of Schwarzlose's 1895 design rotated during the recoil stroke to permit the nonturning bolt to be unlocked, in his 1898 design the

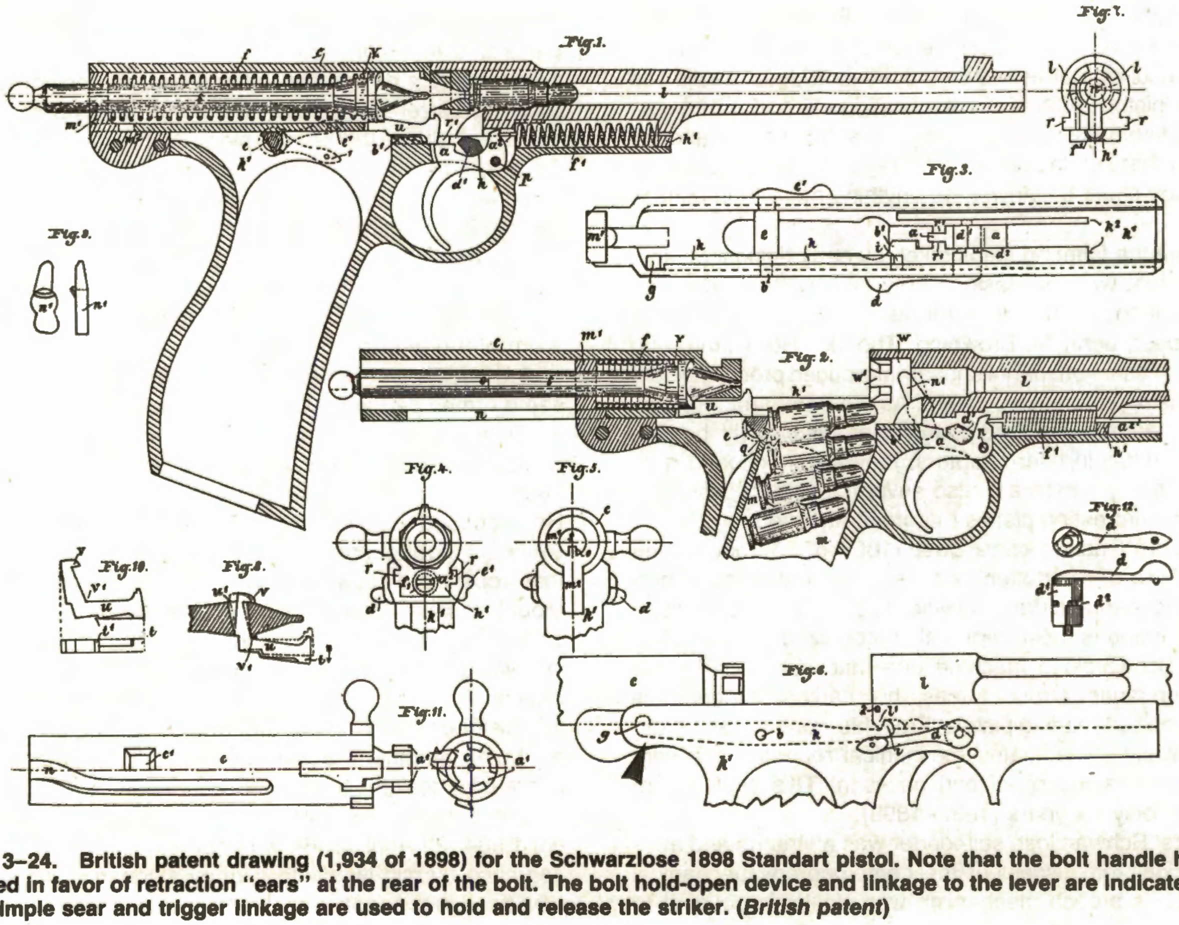


FIGURE 3–24. British patent drawing (1,934 of 1898) for the Schwarzlose 1898 Standart pistol. Note that the bolt handle has been eliminated in favor of retraction "ears" at the rear of the bolt. The bolt hold-open device and linkage to the lever are indicated by the arrow. Simple sear and trigger linkage are used to hold and release the striker. (*British patent*)

FIGURE 3–25. The 7.63 × 25mm 1898 Schwarzlose self-loading pistol, serial number 183. (*Visser*)

Specifications	
Caliber	7.63 × 25mm
Overall length	273mm
Barrel length	163mm
Weight	785 grams
Rifling/twist	4/right
Method of operation	Recoil
Method of locking	Rotary locked bolt
Feed device, capacity	7-shot box magazine

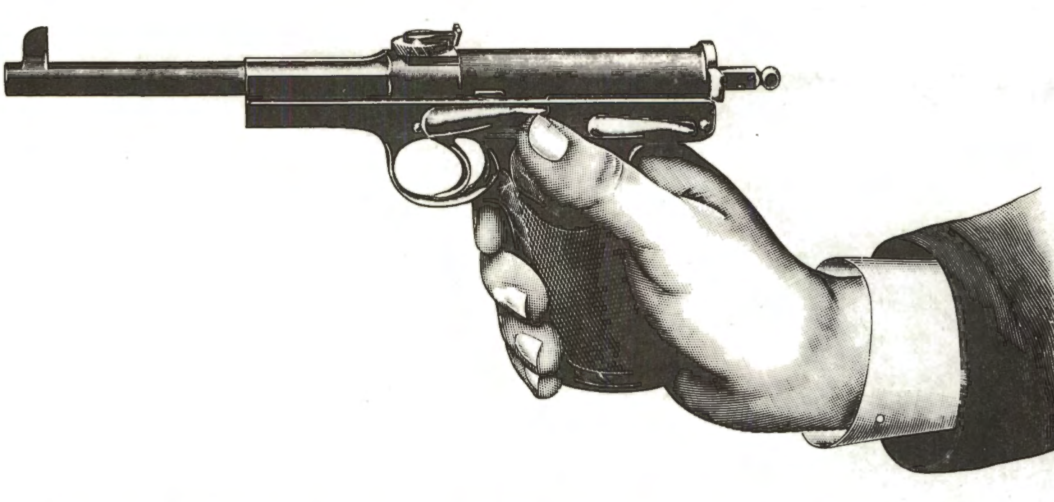
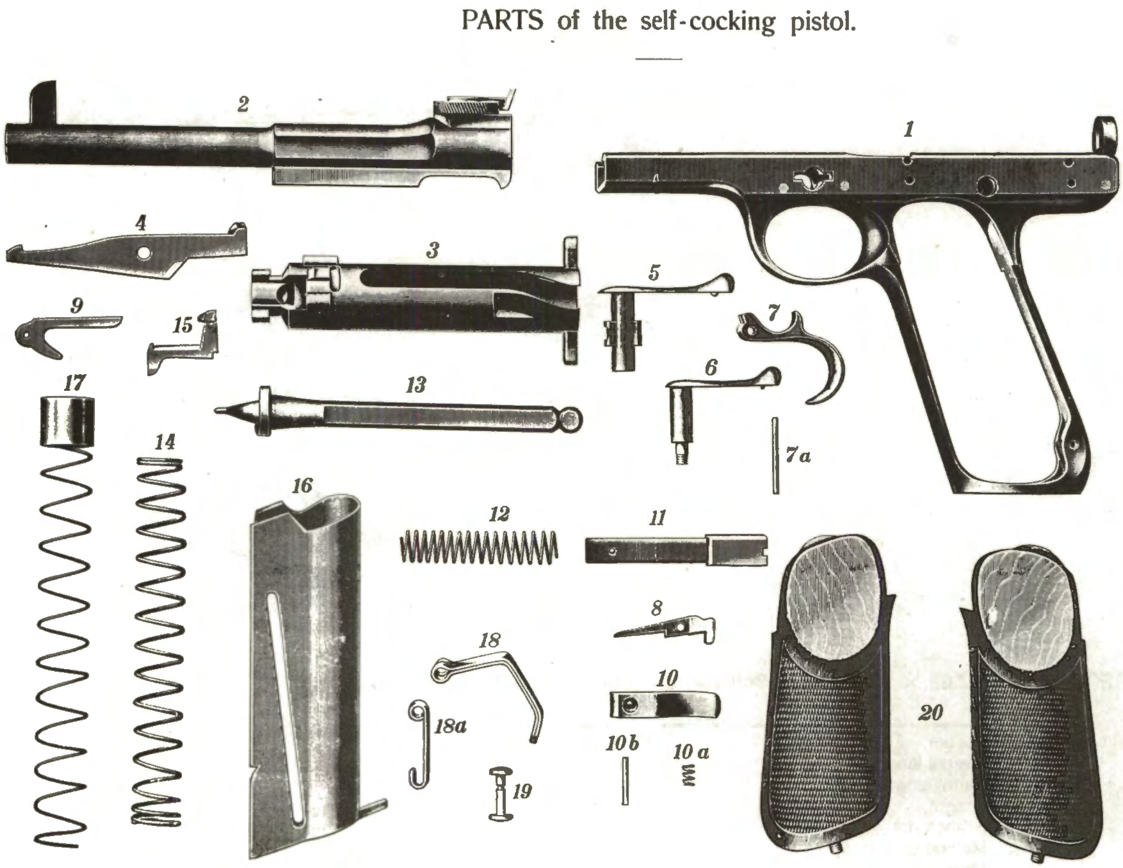


FIGURE 3–26. Gripping the Schwarzlose Standart self-loading pistol. (*Schwarzlose manual*)



Pistol.

1. Case with guide piece and fitting piece.
2. Barrel with sight and aim.
3. Breech cylinder.
4. Barrel holder.
5. Safety lever.
6. Setting lever.
7. Trigger with pin.
8. Magazine stop.
9. Ejector.
10. Magazine holder with spring and pin.
11. Guide bar.
12. Barrel spring.
13. Firing bolt.
14. Firing bolt spring.
15. Extractor.

Magazine.

16. Magazine case with bottom.
17. Magazine spring with button.
18. Transmitter with bar.
19. Grip pieces.
20. Grip bowls with screws.

FIGURE 3–27. The 7.65mm Schwarzlose self-loading pistol. (*Schwarzlose*)

bolt did the rotating. When the Standart was fired, the barrel and the bolt assemblies recoiled in reaction to the bullet's flight down the barrel. After traveling 19 millimeters, the barrel was stopped by the full compression of the spring beneath the barrel. Meanwhile, the bolt had rotated 45 degrees counterclockwise, the result of the cam being mounted on the receiver ring. Having rotated through 45 degrees, the bolt was free to continue its rearward travel for another 50 millimeters. As the bolt moved rearward, the barrel assembly, powered by its compressed recoil spring, returned forward for 4.8 millimeters until it was caught by the barrel *holder* (catch). Ejection of the fired cartridge occurred toward the end of the recoil cycle when a lug on the bolt actuated the ejector. On the return stroke, the bolt was propelled by the return spring. Traveling forward, the bolt stripped the next cartridge from the magazine, fed it into the chamber, and then rotated shut. In the process of rotation, the cylindrical section of the bolt depressed the rear of the barrel catch, thus permitting the locked bolt and barrel assemblies to continue their forward travel. The striker was held in the cocked position by the combination sear-extractor.

Schwarzlose's 1898 pistol was the first commercially-offered handgun that incorporated a hold-open device actuated by the last cartridge in the magazine. When the feed device was empty, the magazine held the bolt open, and when the bolt hold-open lever was pushed up, the bolt would remain open while the magazine was removed. Failure to use the hold-open lever caused the bolt to fly forward on the removal of the magazine. The safety lever was pushed up to lock the mechanism and down to fire it.

Despite the fact this was an interesting and advanced design, for some unexplained reason the Schwarzlose Standart was neither a commercial nor a military success. Likewise, details about the number manufactured by Schwarzlose's factory in Berlin are very sketchy. It was offered for sale in Germany, England, and the United States. Russian revolutionaries reportedly purchased 1,000 for use in their abortive 1905 rising against the Imperial government (these pistols were confiscated at the Russian border and subsequently used by Imperial frontier guards). It is speculated that Schwarzlose was unable to compete with the Borchardt and Mauser pistols being made on larger and more economical levels at the Deutsche Waffen-und Munitionsfabriken and the Mauserwerke. Or perhaps Schwarzlose's timing was bad. He may have introduced the pistol at a time when the market could not absorb another self-loader, a weapon type that was still an unproven product. It should also be noted that the Standart was chambered for the 7.65 × 25mm Borchardt cartridge, virtually indistinguishable from the 7.63 × 25mm Mauser round. As a consequence, the 1898 Standart can be referred to as either a 7.65mm or a 7.63mm pistol.

In 1900 and 1901, Schwarzlose patented two variants of the toggle-link pistol mechanism (British patents 6,056 of 1900 and 13,394 of 1901), but it is unclear if experimental

FIGURE 3–28. The 7.65mm Schwarzlose blow-forward self-loading pistol. (*Krcma*)

TABLE 3–1 COMPARISON OF BORCHARDT, MAUSER, AND SCHWARZLOSE STANDART AMMUNITION

	Standart	*Borchardt*	*Mauser*
Caliber (mm)	**7.63 × 25**	**7.65 × 25**	**7.63 × 25**
Projectile weight (grams)	**5.5**	**5.5–5.6**	**5.0–5.95**
Velocity at 5 meters (m/sec)	**450***	**385**	**443**
Energy 5 meters (joules)	**550***	**406**	**539**

***Energy and velocity for the Standart were measured at the muzzle rather than at 5 meters.**

models were ever built. The 1900 design was a hesitation blowback mechanism without a locked-breech mechanism. In the closed position, the toggle-link was folded; it unfolded during the recoil cycle, thus resisting recoil forces until the chamber pressures were reduced to a safe level. This idea was used to better effect in his 1905 machine gun design. Since this is virtually the same mechanism as that patented in the United States for his machine gun (712,730 and 712,972, 4 November 1902), it could be supposed that he planned all along to use the idea in a machine gun and not a pistol.

Apparently his machine gun project occupied his attention for several years because Schwarzlose did not return to pistol designs until 1907 when he patented a blow-forward pistol (British patent 18,188, 12 August 1907; U.S. patent 932,183, 24 August 1909). There have been very few blow-forward handgun designs, and this was the only one to achieve any real success. Two others, the Mannlicher and the Kumoro, will be described later. In the 1908 Schwarzlose, the breech was a fixed part of the frame, and the barrel was free to slide forward against its return spring. The pistol was loaded by pushing the barrel forward; when it was propelled closed by its spring, a cartridge was stripped from the magazine into the chamber. When fired, the barrel moved forward with the projectile, and the case which remained stationary was ejected once the barrel was fully forward. This pistol, which reportedly had a very severe recoil, was manufactured for only three years (1908 to 1911) and marketed for a short time in the United States by the Warner Arms Corporation of Brooklyn.[9] Even though Schwarzlose's designs were not commercially successful, his work was significant because he tried so many different possibilities.

It was Newton's third law—to every action there is always opposed an equal reaction—that plagued the designers of self-loading pistols. When a pistol was fired, the bullet was accelerated down the barrel, but the pistol was also accelerated. The velocity of the pistol was much less than that of the projectile because of the pistol's greater mass. The calculation of the velocity of the pistol was complicated by the interaction of three factors: the reaction of the gun to the acceleration of the bullet; the reaction of the gun to the acceleration of the propellant (in the form of the gases evolved in the barrel); and the reaction of the gun to the muzzle blast that occurred when the bullet left the barrel and released the pent-up gases. Simplified, the recoiling velocity for the pistol can be approximated using this formula:

$$\text{Velocity of pistol} = \frac{\left(\text{projectile weight} + 1.5 \times \text{powder weight}\right) \times \text{projectile velocity}}{\text{weight of pistol}}$$

For the Schwarzlose, the equation would look like this:

$$\text{Velocity} = \frac{(5.5 + 1.5 \times 0.5) \times 450}{785}$$

$$\text{Velocity} = 2 \text{ meters per second}$$

Clearly, the weight of the handgun had a direct effect on the recoil. The Standart would move rearward at about 2 meters per second as its projectile moved forward at 450 meters per second if the breech did not unlock. But in self-loaders, part of that recoil velocity was used to accelerate the recoiling parts, and the velocity was partly absorbed by that movement. A revolver and self-loader of the same weight firing a projectile of the same weight with the same muzzle velocity would recoil differently; depending on the design the revolver would usually have greater recoil.

Taming the recoil and putting it to work was the task facing the handgun maker. Generally, the higher the velocity and the greater the weight of the projectile, the more complex the locking mechanism and the heavier the total weapon. In a simple blowback handgun, a high-velocity projectile led to excessive acceleration of the recoiling parts. Increasing the weight of those parts to overcome the effects of acceleration often resulted in a severe weight penalty. A more complicated locking mechanism allowed the pistol to be fired with less acceleration to the recoiling parts, but a greater number of parts were required to make the pistol. Designers, therefore, had to match the type of operating mechanism to the cartridge and balance the complexity of the design with a reliable performance. In the Standart pistol, the number of components was reduced to an absolute minimum, but Schwarzlose probably fell a little short of the mark when he matched cartridge and gun weight. The result was a slight increase in the weight of the recoiling parts. Hugo Borchardt's C93 pistol was probably better tailored to its 7.65mm cartridge. Using the recoil formula, the recoiling velocity for the Borchardt can be calculated to be 1.1 meters per second. Similar computations for the Mauser C96 pistol provide a recoil velocity of 1.3 meters per second.

Types of Self-Loading Pistols

By the end of the nineteenth century, there were enough different self-loaders available to classify them according to their system of operation. A. Fleck in the *Kriegstechnische Zietschrift* (Military Technology Newspaper) (issue 2, 1901) organized the self-loaders into several groups:

> The best known automatic pistols may be divided into the following classes:
>
> 1. Pistols with mechanism not locked.
>   a. Those in which the bolt is merely pressed against the barrel by a recoil spring and recedes upon the weapon's being discharged. [blow-back]
>   b. Those in which the barrel, being under pressure of a barrel spring, advances upon the discharge of the weapon. [blow-forward]
> 2. Pistols in which the bolt is locked before discharge, and

> upon discharge the barrel and breech mechanism coupled to it recede a certain distance before the unlocking takes place.
>
> a. Bolt mechanism with locks entering from below.
> b. Bolt mechanism, the locking and unlocking of which are effected by the bolt swinging sideways, the bolt being provided with a locking lug.
> c. Bolt mechanism moved and locked by a jointed lever.
> d. Bolt mechanism moved and locked by a block swinging up and backward.
>
> 3. Pistols with a fixed barrel and locked at the moment of discharge.

Fleck went further and divided self-loading pistols into those with the "magazine in the stock and those with magazine in front of the stock or trigger." In an interesting distinction, Fleck also divided pistols into "automatic and semiautomatic," but his use of these terms was different from that which was generally adopted.

> The so-called automatic pistols effect by means of recoil the unlocking of the bolt, the extraction and ejection of the empty cartridge case, the feeding of another cartridge into the chamber, the cocking of the trigger or firing pin, and the locking of the bolt ready for firing. In the so-called semiautomatic pistol only the operation of loading is effected by the recoil, while the cocking of the trigger must be done as in the case of the [single-action] revolver.[10]

In the United States, automatic was a term used to indicate a self-loading pistol that could be fired only once per trigger pull. In many European countries, however, automatic pistols were those that provided multiple shots per trigger pull.*

The compilers of the U.S. War Department *Notes of Military Interest for 1901* used the Fleck system for classifying self-loaders. A review of the comments made in this book gives some idea what military experts in the field of small arms thought about the new weapons. Examining first the blowback-type pistols, the War Department authors evaluated the Bergmann Model 1896 self-loading pistol.

Captain E. A. Edwards and his colleagues at the War Department noted that the Bergmann pistols offered "surprising proof" that firearms could produce "good results even without locking the bolt." In pistols of this class, "the inertia of the bolt and the resistance of the recoil spring can cause the bolt to recede so slowly as to allow the smaller and lighter projectile to leave the barrel before it is possible for the gases to escape to the rear." In making this Model 1896 available, "Bergmann furnished to the public a very useful independent firearm, of which thousands have been" sold in all parts of the world. The bolt of the Model 1896 was pressed against the rear of the barrel by a spiral spring, the recoil spring. When the gas pressure was sufficient to overcome the inertia of the bolt and its spring, the bolt traveled to the rear, cocking the external hammer as it went. Upon reaching the full extent of the recoil, the spring returned the bolt forward, this time stripping a loaded cartridge from the clip. These catridges were unique because of their extremely tapered case and because they did not have an extractor groove. The Bergmann pistol's magazine was also unique. "The magazine is not a closed one as are those on most repeating arms, but is opened on the side by a handle, which feature offers great advantage in loading, unloading, cleaning, etc. The cover of the magazine . . . has an aperture . . . through which the number of cartridges in the magazine . . . can always be seen. Another special aperture renders it possible to observe whether there is a cartridge in the barrel."[11]

The compilers described the Model 1900 Browning 7.65mm pistol as another example of the blowback type. Noting that is was similar in concept to the Bergmann, the report commented that "It is especially distinguished by its extremely compact construction, the magazine being in the stock, and the recoil spring and firing spring being one." Although not sufficiently powerful for military purposes," the pistol is very flat and has no projecting parts, it can be thrust into the breast pocket like a cigar case," according to the report, making it "very well suited for the use of the general public, as for instance, bicyclists and tourists."[12]

Captain Edwards and his associates used the 7.60mm Mannlicher 1894 pistol to illustrate the blow-forward type of mechanism, being the only one in existence at the time. "This semiautomatic pistol is characterized mainly by the forward movement, upon discharge, of the barrel, which is held against the rear of the frame. This model represents a new principle in automatic action, the forward movement of the barrel being principally brought about by the friction of the projectile in the barrel." The lock mechanism of the Mannlicher was quite similar to that of a double-action revolver, and the pistol could be fired either double-action or single-action by cocking the hammer with the thumb.[13] When the Mannlicher cartridge was fired, the bullet and barrel traveled forward inside an outer barrel or barrel jacket, and the cartridge was ejected at the end of the forward cycle. The barrel was held forward by a lever until the shooter released the trigger, at which time the barrel returned to the rear. During the rearward travel, a cartridge was stripped from the magazine into the chamber and the barrel was closed against the receiver frame. The five-shot feed device was reportedly very difficult to load. As an American test report from 1900 noted, "To fill the magazine, the barrel must be held in its forward position with one hand, while the cartridges are inserted singly. . . . When the magazine is full, the top cartridge is held in such a position that the barrel, when allowed to go back to its firing position, slips over it, and the pistol is loaded, ready for firing." The awkwardness of this exercise made loading "very slow and tedious, and it woulds be almost impossible for a man to load it while on horseback."[14]

In evaluating pistols with unlocked breech mechanisms, the War Department commentators concluded that "all of these pistols with spring breech mechanisms work well, generally speaking, but do not insure the degree of safety which must be required for a military weapon." Since poor maintenance or low-grade ammunition could conceivably cause dangerous problems with unlocked-breech pistols, the experts favored pistols with a locked breech that could also be chambered to fire more potent ammunition. Just how powerful the ammunition was to be was a subject for extended debate.

*Except when quoting contemporary documents, "self-loader" will be used to describe self-actuated pistols. "Automatic" will generally denote self-loaders that fire single shots with each trigger pull. Pistols providing multiple fire will be called "machine pistols" or "fully automatic pistols."

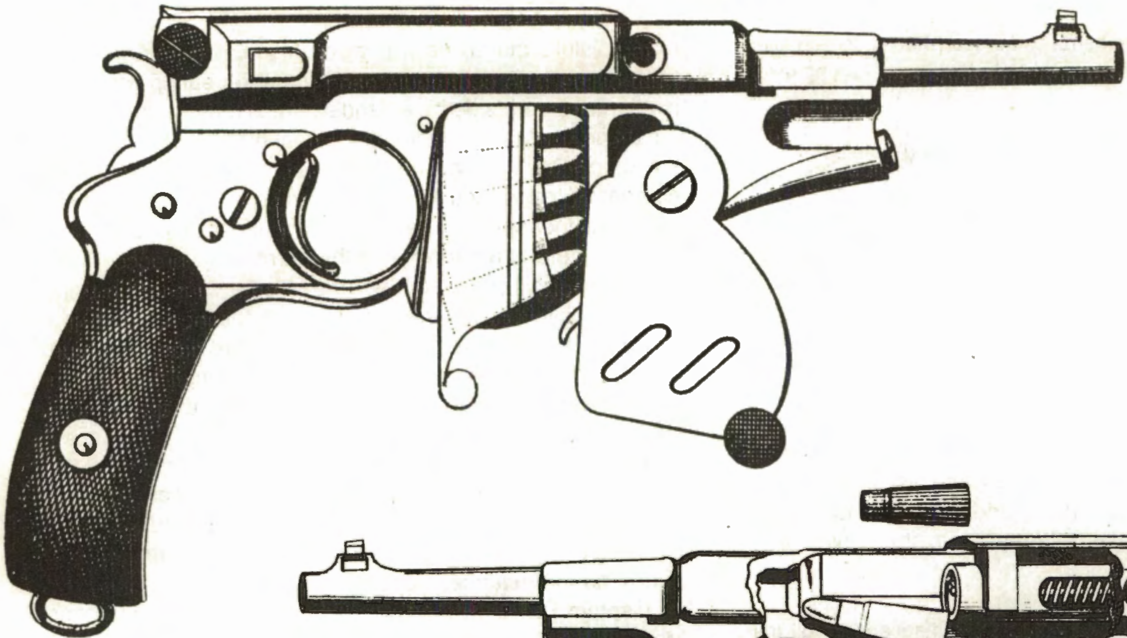


FIGURE 3–29. The Bergmann 6.5mm Model 1896 self-loading pistol from an early Bergmann catalog. Note the special clip used to hold the cartridges. The cartridges are unique because they were not provided with an extracting groove. (*Bergmann*)

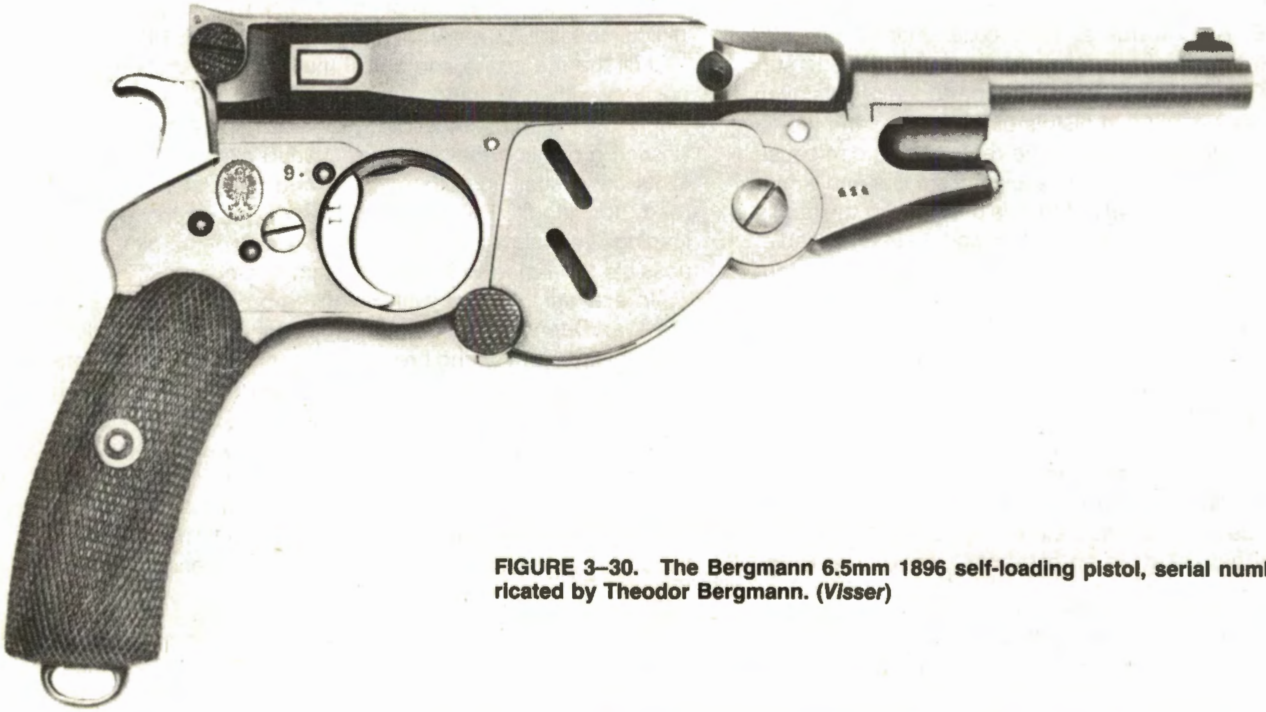


FIGURE 3–30. The Bergmann 6.5mm 1896 self-loading pistol, serial number 414, fabricated by Theodor Bergmann. (*Visser*)

FIGURE 3–31. Fabrique Nationale's first Browning-type self-loading pistol, the 7.65mm Model 1900 (approximately full-size). (*FN*)

FIGURE 3–32. A typical FN Browning Model 1900 7.65mm self-loading pistol. (*FN*)

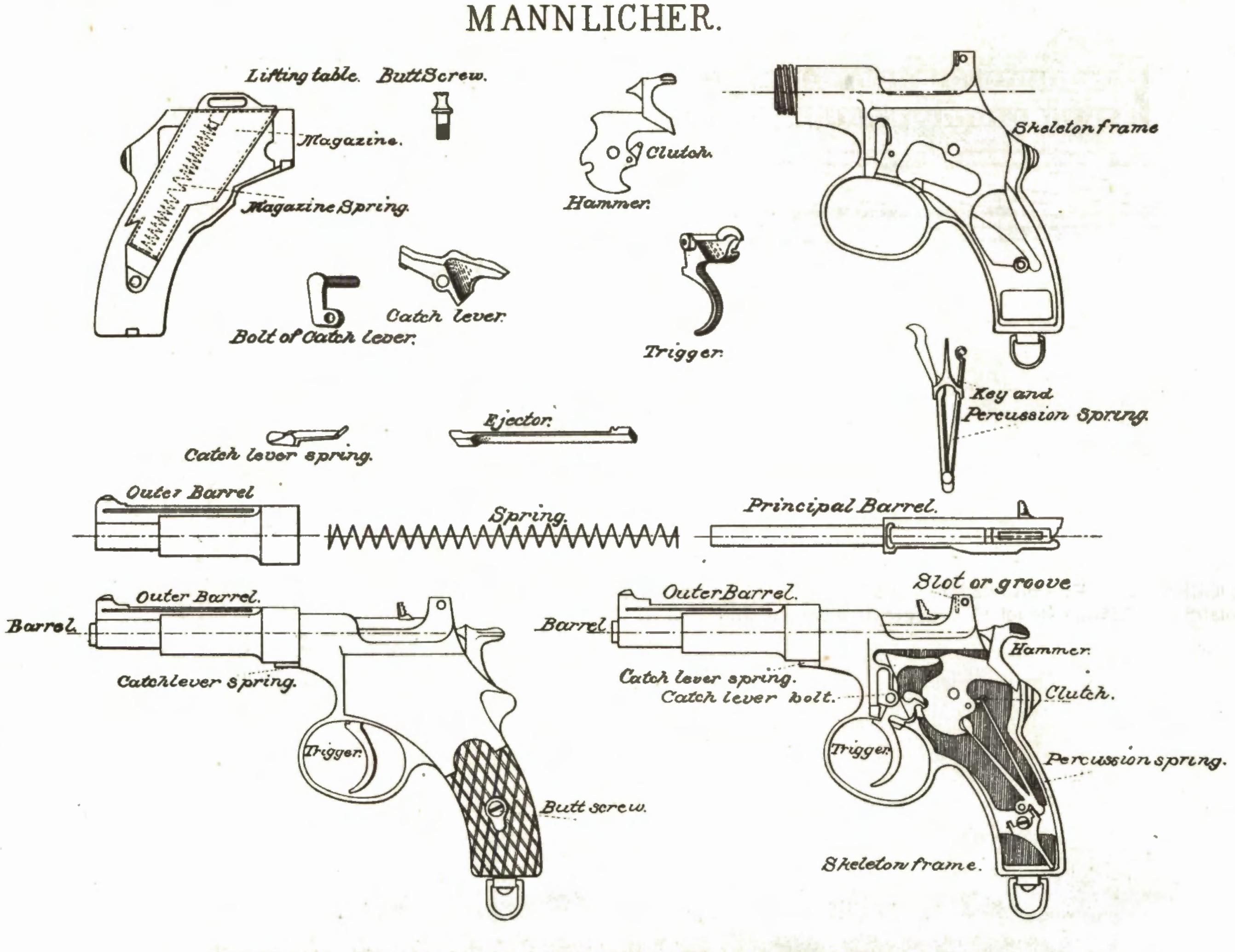


FIGURE 3–33. The 1894 blow-forward-type Mannlicher self-loading pistol. (*U.S. Army*)

As for locked-breech mechanisms, the authors of the 1901 report remarked that in the "most perfect" pistols of this class "the barrel, together with breech mechanism coupled to it, slides back a short distance under the pressure exerted by the powder gases. . . . This movement serves at first only to unlock the bolt, which at the same time has imparted to it sufficient energy to overcome the resistance of the recoil spring and completely open the breech . . . cock the hammer or firing pin and eject the empty shell." Available in this class were the C96 Mauser, the Mannlicher Model 1896, the Bergmann Model 1897, the Borchardt-Luger system Parabellum pistol, and the Spandau (German state arsenal) Model 1896. In the Mauser C96 and the Mannlicher 1896, the locking of the bolt was "effected by a bolt lock which engages in a notch in the underside of the bolt and which, after the barrel and bolt have moved a short distance to the rear, drops downward." The locking mechanism of the Bergmann 1897 pistol worked differently—after sufficient recoil with the bolt locked to the barrel, the bolt lock was pivoted sideways so that the bolt was freed from a locking recess in the barrel extension. "The Parabellum pistol of Borchardt-Luger holds the breech mechanism rigidly locked as long as the two branches of the jointed-lever mechanism are in a straight line. The bolt is unlocked only when, after the rearward movement of the barrel, the cheeks of the jointed lever strike the curved side plates of the frame and the lever bends upward."[15]

The 1896 Spandau pistol was unorthodox, even in 1901. Looking more like a revolver than a self-loader, the upper portion of the frame, which carried the barrel and breech-piece, slid to the rear on the inclined surface of the lower frame. As the upper part moved to the rear, a lever mechanism pushed the breech-piece upward so it rose into the shooter's line of sight. Rising-block, self-loading pistols were a very rare type, and only a very few were manufactured.

While the designers of the Mauser and Mannlicher pistols employed fixed magazines charged by loading clips, the creators of the Bergmann Parabellum and Spandau self-loaders opted for detachable magazines. Mannlicher and Borchardt-Luger had placed the feed device in the pistol grip, and the developers of the Mauser, Bergmann, and Spandau placed the feed device in the trigger guard. The Mauser, Mannlicher, and Bergmann had double-row (side-by-side) magazines, while the Parabellum and Spandau had single-row feed devices. Only the Model 1896 Spandau was semiautomatic (single-action); all the rest were automatically cocked. In ascending order, the calibers of these handguns were 7.63mm

FIGURE 3–34. An early 1894 Mannlicher self-loading pistol with serial number 16. These early models fired a rimmed, straight-case, 8mm cartridge. (*Visser*)

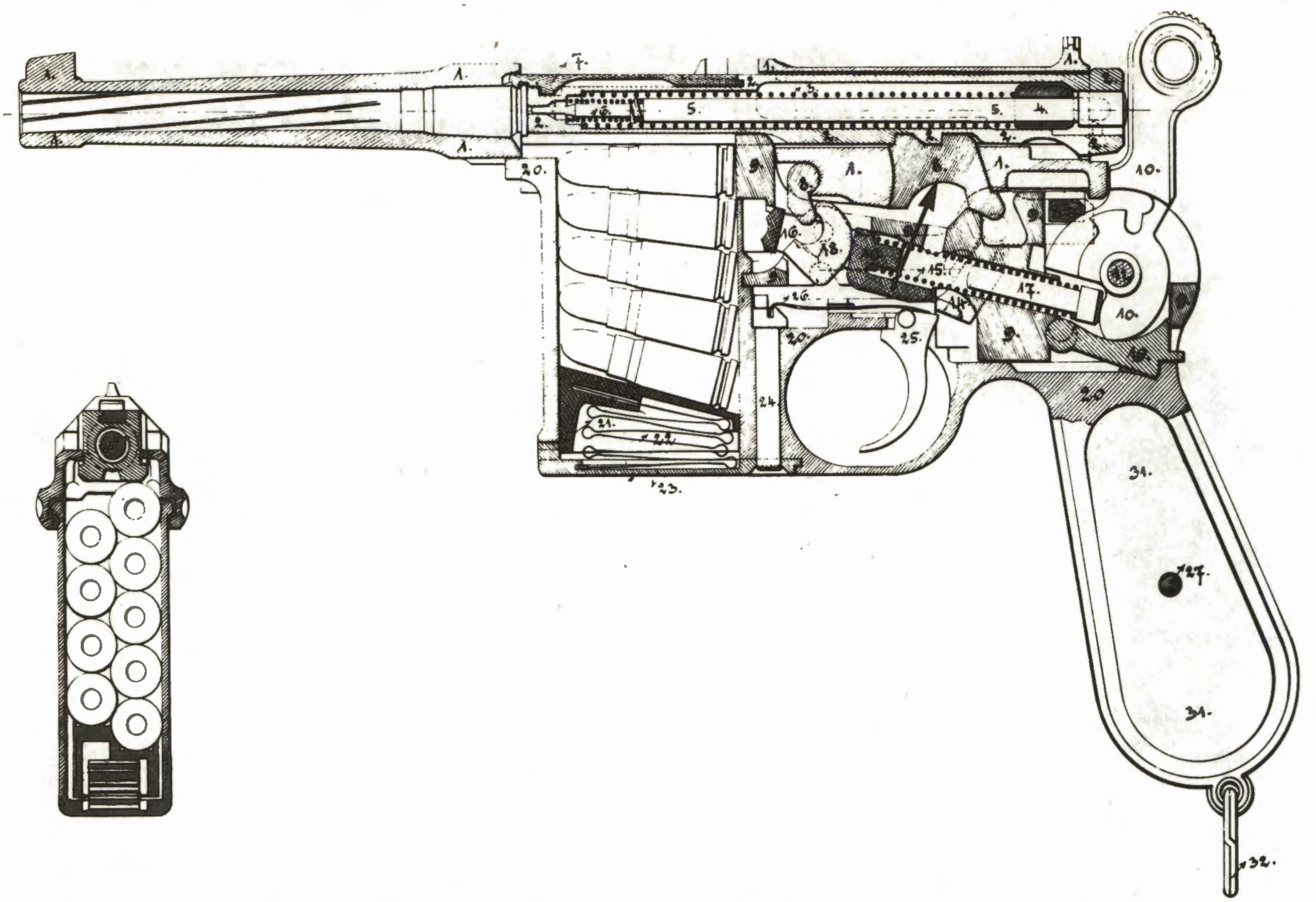


FIGURE 3–35. A sectional view of the operating mechanism of the 7.63mm Mauser C96 self-loading pistol. The arrow indicates the locking block and its relationship to the bolt. (*Mauser*)

for the Mauser, 7.65mm for the Parabellum, 7.82mm for the Bergmann, and 8mm for the Spandau. According to the Military Information Division report of 1901, "the projectiles of the Mauser and Bergmann pistols attain a velocity of about 400 meters per second at 25 meters from the muzzle, those from the model 1900 Parabellum pistol about 350 meters." No figures were available for the Spandau design.

For self-loaders with fixed barrels and with breech mechanisms that lock at the moment of discharge, Edwards and his colleagues elected to describe the Mannlicher 1900 pistol. Locking was accomplished by the hammer, which resisted the recoiling action of the bolt mechanism (today called a hesitation lock or retarded blowback because the action of cocking the hammer by the recoiling bolt did not provide a positive lock). Experts agreed that the 1900 Mannlicher was extremely simple and lightweight with a single-action hammer mechanism. It fired the 7.63 × 21mm cartridge, called the 7.65mm Mannlicher in Germany.

In evaluating these various self-loaders, Edwards and the others prefaced their remarks: "It would be a very difficult matter to decide which of the afore-mentioned pistols is the best, as each one has its advantages and disadvantages. For private persons who merely require a weapon accurate for sporting purposes the choice is only a matter of taste, as all the known models fire very well at short ranges." Utilization of these pistols for the military was another matter completely, however. "When the first long-range automatic pistols of Borchardt, Bergmann, and Mauser appeared on the market many laymen thought that these excellent weapons [equipped with shoulder stocks (called pistol carbines)] might be welcomed as a substitute for the cavalry carbine." Admittedly, the authorities wanted to lighten the cavalry trooper's armament and equipment load and provide him with a rapid-shooting weapon. But many specialists and cavalrymen believed that mounted soldiers needed greater range more than they needed rapidity of fire. In the United States, at least, the pistol carbine was not a favored weapon. The self-loader was suitable for the close-in battle, but for long-range engagements the Americans relied on their carbines.

The Americans were also building a case for a large-caliber pistol. "The pistol should, above all things, stop on the spot an enemy who has approached to within close range. An excessive feeling of humanity in this matter would be thoroughly false and would have eventually to be paid for in blood." Edwards and his fellow specialists believed that a successful military projectile would have to be at least 8mm with a flattened top or a hollow point. They did not consider full-metal jacketed projectiles with flat tips or hollow noses

FIGURE 3–36. The 7.63mm 1896 Mannlicher self-loading pistol. (*Visser*)

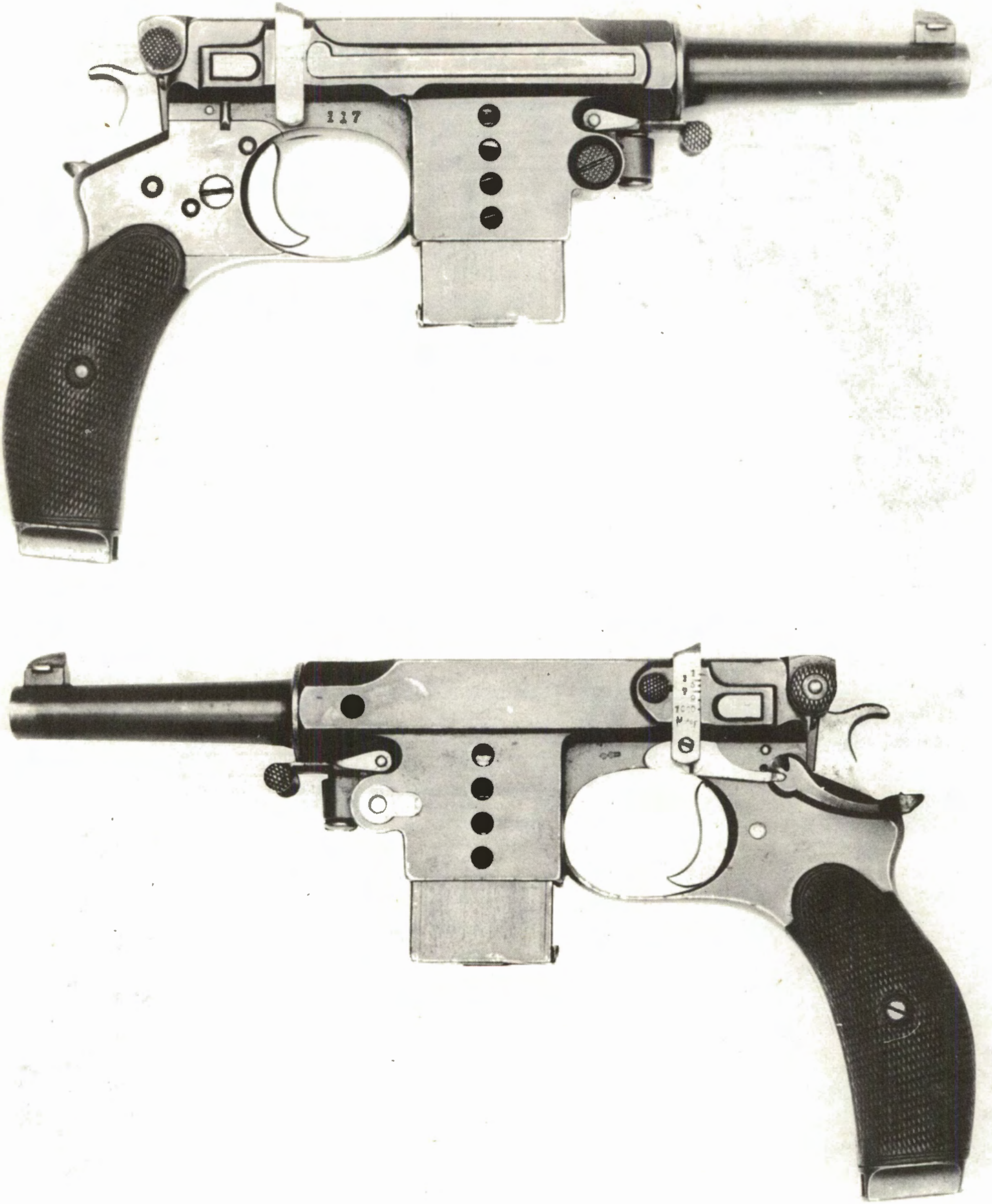
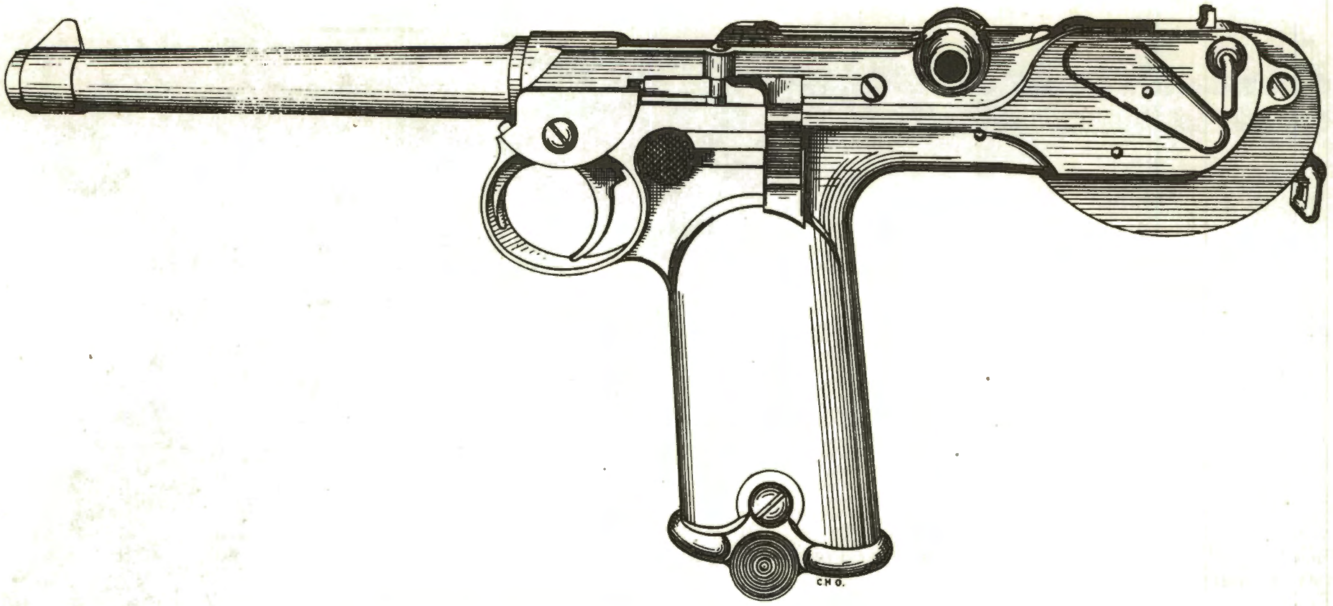
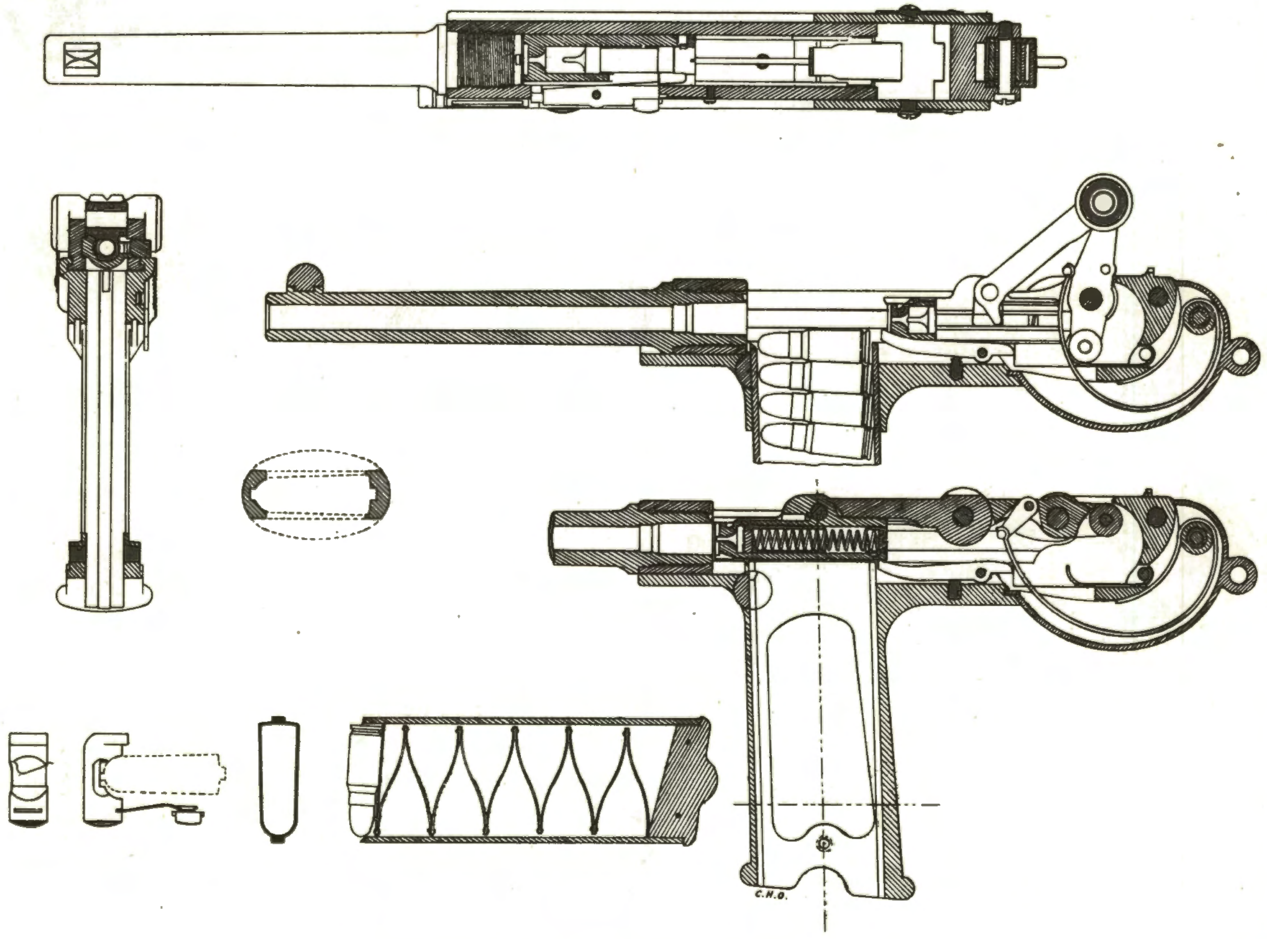


FIGURE 3–37. The 7.82mm Bergmann 1897 self-loading pistol, serial number 117. (*Visser*)



Borchardt Automatic Repeating Pistol.



Borchardt Automatic Repeating Pistol.

FIGURE 3–38. The Borchardt 1893 pistol as illustrated in an 1894 U.S. Army Military Information Division intelligence report. (*U.S. Army*)

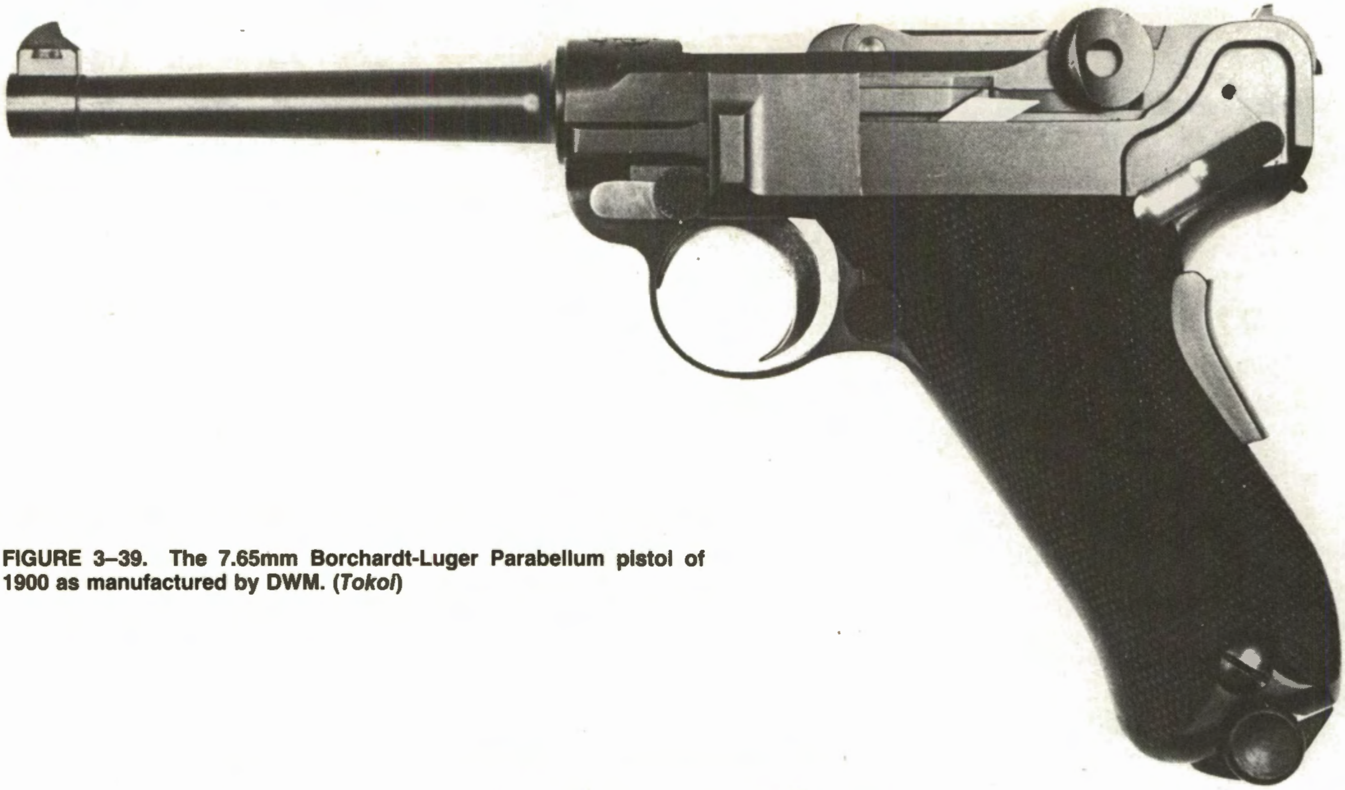


FIGURE 3–39. The 7.65mm Borchardt-Luger Parabellum pistol of 1900 as manufactured by DWM. (*Tokol*)

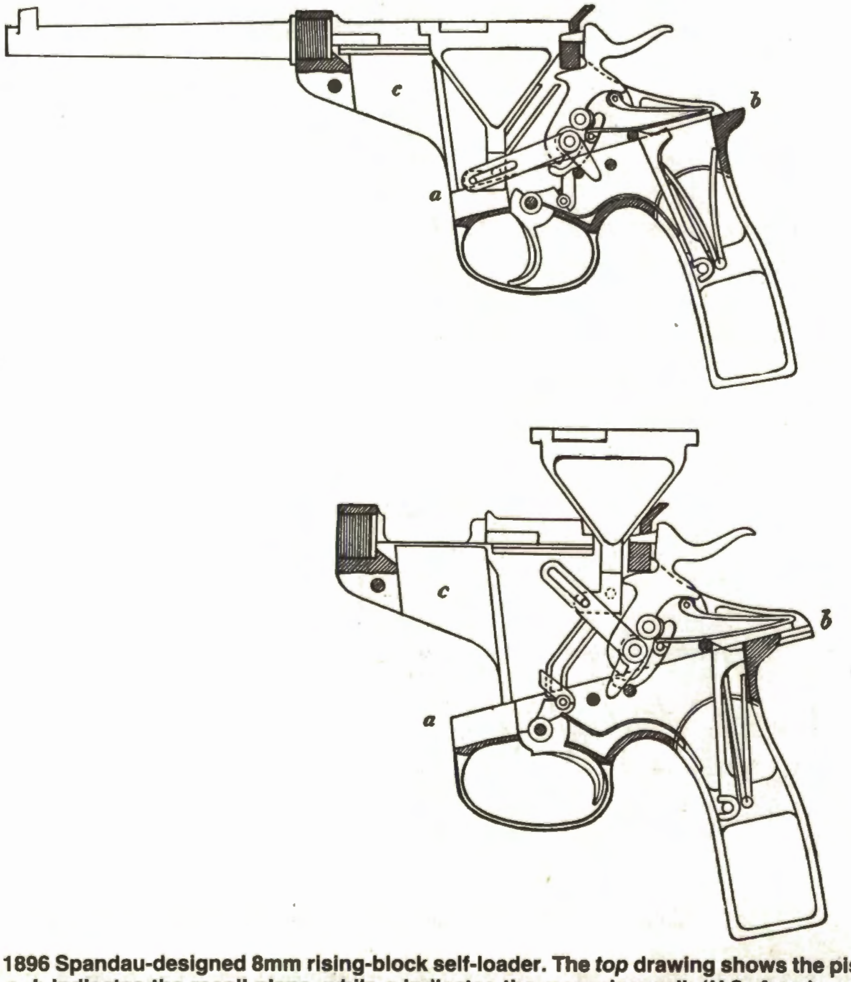


FIGURE 3–40. The 1896 Spandau-designed 8mm rising-block self-loader. The *top* drawing shows the pistol prior to firing; the *bottom* after firing. The line *a–b* indicates the recoil plane, while c indicates the magazine well. (*U.S. Army*)

to be as "inhumane as the soft-lead pistol bullets with cup-shaped head . . . as no deformation takes place in the body [of the target]."

Looking at other aspects of the ideal military pistol, they noted that to obtain a light weapon it would be necessary to locate the magazine in the grip. The least complicated mechanism would be favored because it could be understood by the least technically inclined users. Unfortunately, as they pointed out, the locked-breech pistols—the type theoretically best suited for military purposes—were generally much more complicated than the blowback types. A magazine capacity of 15 to 20 rounds was desirable but required a grip thickness that was unsuitable for most shooters. Furthermore, cartridge length would be limited to about 30 millimeters in any pistol when the magazine was enclosed in the grip. Another necessity was "a good safety device . . . to preclude all possibility of accident. Such a device must work automatically, or else it must be visible from outside whether or not the safety lock has entered the notch in the hammer, etc., as the ideas of the marksman are easily confused in critical moments." Captain Edwards was also puzzled over the virtue of a pistol being cocked at the end of the firing cycle. Many military authorities did not like the idea of the trooper being left with a readily discharged weapon. They preferred that the cavalryman cock the gun after each shot. "The question whether an automatic or semiautomatic pistol should be adopted will be very hard to decide. If an automatic pistol be introduced, it is evident that a certain number of accidents can not be avoided, for it is well known how easily the nerves give way, the finger jerks, the next shot goes off unintentionally, and perhaps a comrade may be struck. By providing a long trigger pull this danger may be avoided." Although complicating possible design work, they believed that it might be desirable to arrange for self-cocking or noncocking by creating components that could be added or removed from the weapon. There was a general belief that officers could manage self-cocking pistols but enlisted men could not. And it was generally held that a hammer-type weapon was safer than a striker-type—it was easier to determine when the hammer-type was cocked and ready to fire. Double-action was important because it permitted a quick first shot without requiring the gun to be carried cocked. An indicator disclosing the number of cartridges remaining in the magazine and the shoulder stock holster were other attractive options.[16]

As Captain John T. Thompson of the U.S. Army Ordnance Department was to say in 1904, self-loading "pistols have not yet been developed sufficiently to establish the superiority of a particular type." But both Thompson and the authors of the 1901 notes agreed that self-loading pistols showed promise. Summarizing the U.S. Army position, Thompson listed the elements that should be included in a suitable self-loading pistol. In many respects, they were the same as those listed by Captain Edwards in 1901. Thompson's criteria are presented as a meter-stick against which the self-loaders discussed in later chapters can be evaluated.

A.— The design should embody the following features, considered as essential:
- a.— A simple, strong and durable mechanism, composed of as few parts as possible, readily dismounted and mounted with as few tools as practicable, and assembled with the minimum number of springs, screws or pins; the mechanism should be as compact as practicable;
- b.— The use of the pistol as a short-range weapon (75 yd. [69 meters] maximum range) and not as a carbine;
- c.— The bolt to be locked, or in its firing position, before the firing mechanism can be operated;
- d.— A safety lock, or a hammer and rebound firing pin; the lock placed so as to be readily operated by the thumb, and of such a shape and in such a position as to prevent its being misplaced in drawing or returning the pistol, or when carrying the loaded pistol in a holster;
- e.— The breech-block to remain open when the last cartridge in the magazine has been fired;
- f.— A magazine to hold at least six cartridges;
- g.— Caliber not less than 0.45 in. [11.43mm];
- h.— Weight of bullet not less than 250 grains [16.2 grams];
- i.— Initial velocity not less than 725 ft. per sec. [220 meters per second];
- j.— The trigger pull, measured at center of contact of finger with bow of trigger, to be not less than 6 lb. [2,722 grams].

B.— The following features are desirable:
- a.— A safety sear or device operated by the grip of the hand in firing position;
- b.— A simple device which will permit the bolt to move forward into its firing position when the loaded magazine is fully inserted, or when the last cartridge is charged from the clip, ejecting the clip;
- c.— Recocking the piece without moving the bolt in case of misfire;
- d.— No special tools for dismounting or assembling;
- e.— In the construction, such separation of parts that each part may be readily replaced in case of repair; parts riveted together or more or less permanently joined are objectionable;
- f.— The pistol should handle and balance well.

C.— The following features are preferable:
- a.— A bolt securely locked to the barrel before firing and remaining locked until the bullet has left the bore, to an unlocked breech-block;
- b.— A separate magazine or cartridge holder to clip-loading;
- c.— A bolt in one piece to a bolt with a separate head;
- d.— Since the spreading or mushrooming effect of bullet rather than penetration is desired, bullet material will be preferred in the following order, lead, soft nose, jacketed; the jacket material at the point to be as thin as practicable;
- e.— The point of the bullet should be as flat as practicable.[18]

NOTES

1. James J. Stokesberry, "The Development of Smokeless Gunpowder by the United States Navy, 1889–1900," unpublished master's thesis, University of Delaware, June 1965, pp. 5–14.

2. Hiram S. Maxim, *My Life* (London: Methuen & Co., Ltd., 1915), p. 238; and George M. Chinn, *The Machine Gun: History, Evolution, Development of Manual, Automatic, and Airborne Repeating Weapons,* vol. 1 (Washington: GPO, 1951), pp. 123–49.

3. Wilson and Hogg, *Textbook of Automatic Pistols,* p. 67.

4. Claude Blair, *Pistols of the World* (New York: Viking Press, 1968), pp. 54–58; and R. K. Wilson with I. V. Hogg, *Textbook of Automatic Pistols* (London: Arms & Armour Press, 1975), pp. 3–7.

5. Blair, *Pistols of the World,* pp. 55–56; Roy G. Jinks, *History of Smith & Wesson* (North Hollywood: Beinfeld Publishing, Inc., 1977), pp. 16–33; and Harold F. Williamson, *Winchester: The Gun That Won the West* (South Brunswick and New York: A. S. Barnes and Co., 1952), pp. 3–44.

6. Wilson and Hogg, *Textbook of Automatic Pistols,* pp. 52–55; and Wilson, "Self Loader 70 Years Ago: A Close Look at the Magnificently Made Schönberger," *Gun Review* 2 (Feb. 1962):10–12.

7. Military Information Div., Adjutant General's Office, War Dept., *Notes and Statistics of Organization, Armament, and Military Progress in American and European Armies,* no. 8 (Washington: GPO, 1896), p. 215.

8. Wilson and Hogg, *Textbook of Automatic Pistols,* p. 11; and Hogg and John Weeks, *Pistols of the World* (London: Arms & Armour Press, 1978), p. 209.

9. Wilson, "Schwarzlose Pistols: Revolutionary Products of the Early 1900s," *Gun Review* 2 (April 1962):20–23, 29; Wilson and Hogg, *Textbook of Automatic Pistols,* pp. 10, 62–65; John Walter, *Luger: An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present Day* (London: Arms & Armour Press, 1977), pp. 14–15, 18; and J. Howard Mathews, *Firearms Identification,* vol. 1, *The Laboratory Examination of Small Arms; Rifling Characteristics in Handguns and Notes on Automatic Pistols* (Springfield, IL: Charles C. Thomas Publisher, 1962), pp. 271–74.

10. Military Information Div., Adjutant General's Office, War Dept., *Notes of Military Interest for 1901,* E. A. Edwards et al., comps. and eds., no. 36 (Washington: GPO, 1902), pp. 171–72;

11. Ibid.

12. Ibid.

13. Ibid., pp 172–76.

14. War Dept., *Annual Reports of the War Department for the Fiscal Year Ended June 30, 1900,* vol. 3, *Report of the Chief of Ordnance* (Washington: GPO, 1900), pp. 184, 187.

15. Ibid.

16. Military Information Div., *Notes of Military Interest for 1901,* pp. 173–83.

17. John T. Thompson, "The Art of Designing and Constructing Small Arms," in *Transactions of the American Society of Civil Engineers,* vol. 54, pt. B, International Engineering Congress 1904, paper 27 (1905), pp. 377–78.

4 THE DESIGNS OF HUGO BORCHARDT AND GEORG LUGER, 1893 TO 1914

The four central figures in this story are: Ludwig Loewe (1837–1886), his brother Isidor (1848–1910), Hugo Borchardt (c.1845–c.1921), and Georg Luger (1849–1923). Loewe, the entrepreneur of the group, created the industrial firm that made possible the production of Borchardt's and Luger's pistols. Together Borchardt and Luger designed a pistol that became known around the world for its reliability. It was known as the *Parabellum* in Europe and called the *Luger* in the United States. Unfortunately, very little is known about the four men responsible for this popular self-loader and other pre-World War II-era weapons.

LUDWIG AND ISIDOR LOEWE

The Loewe brothers were German Jews, which may explain why so little information about them survived. In a 1939 history of the first 50 years of the German firm Deutsche Waffen- und Munitionsfabriken (DWM), there is only passing mention of the parent firm Ludwig Loewe und Companie and no mention of the company's founder.[1] Apparently, this Nazi government-sponsored publication did not wish to dwell on the fact that one of Europe's leading arms manufacturers had as one of its ancestors the weapon and machine tool empire of Ludwig Loewe.

Ludwig Loewe began his career in the 1860s as a manufacturer of machine tools. By the end of the decade, he was contemplating entering the sewing machine manufacturing business, as well, and with employee Eduard Barthelemes traveled to the United States in 1869 to visit sewing machine and machine tool companies. Loewe und Companie began making sewing machines the next year, 1870, the year of the Franco-Prussian War. As a result of that conflict, the Loewe firm signed its first government contract with the military for the manufacture of one million rifle sight assemblies. Loewe's reputation for high-quality military products grew in proportion to the number of domestic and foreign contracts he won, and the skillful German soon expanded his operations to include arms making. One of his major contracts in this period was with the Imperial Russian government for 70,000 .44 caliber (11.18mm) Third Model Russian revolvers. An unspecified number of this Smith & Wesson-type revolver was also made for the Turkish army. Among Loewe's major customers for gunmaking machinery was Europe's most important rifle maker, Gebrüder Mauser and Companie of Oberndorf.

When Ludwig died on 11 September 1886, Isidor took over management of the business. In November 1886, on behalf of Ludwig Loewe and Companie, Isidor entered into a joint venture with Waffenfabrik Mauser, AG for the sale of rifles to Turkey.* The two firms won the rifle contract after a tough contest, and from that point on the activities of these two arms manufacturers became intertwined, each factory helping out the other as needed. In addition to its share of the Turkish contract (295,000 rifles), Mauser built the 205,000 9mm Model 1887 rifles Loewe had agreed to, while Loewe manufactured 425,000 Modell 1888 Reichs Commission-Gewehr, a gun Mauser had no interest in making.

Meanwhile, Isidor Loewe was negotiating to purchase a substantial portion of the public shares of the Waffenfabrik Mauser, AG. The Württembergische Vereinsbank had acquired most of Mauser's stock the first year it was available, but on 27 December 1887 the Loewe firm acquired all of the bank's shares. By 1896, the stock held by Loewe had a face value of two million marks ($476,000). Paul Mauser remained at the works as technical director, and the factory kept his name, but Isidor Loewe controlled the company and, with it, a substantial portion of the small arms manufacturing capability of the world.

On 6 February 1889, Ludwig Loewe & Cie acquired, but ran as an independent concern, the firm Deutsche Metallpatronenfabrik Lorenz, a leading German ammunition factory. This cartridge company had been a joint venture involving propellant-makers Pulverfabrik Rotweil-Hamburg and Vereinigte Rheinische-Wsetfalische Pulverfabriken. The Loewe operation was undeniably becoming one of the most powerful small arms manufacturing combines in Europe.

As the result of the 1896 decision to merge the arms making activities of Ludwig Loewe & Cie with the ammunition activities of the Deutsche Metallpatronenfabrik, a new firm was established, the Deutsche Waffen- und Munitionsfabriken (DWM), Aktiengesellschaft (AG). Shares held by the Ludwig Loewe concern in various other companies were transferred to DWM.† Isidor Loewe's subsequent relationship to DWM

*Gebrüder Mauser and Companie changed its name upon becoming a public corporation in 1884.

†This included the Mauser stock, 5,850 shares of Fabrique Nationale worth $564,525, and $60,900 interest in the Fegyver és Gépgyár Részvéntarsasag, Budapest.

is unclear. He may have remained a major stockholder. He was still a member of the Mauser board of directors when he died in 1910.

On 15 December 1896, DWM sent out a form letter to announce the changes in its name and the composition of its management. "We have the honour to inform you that the 'Deutsche Metallpatronenfabrik' in Karlsruhe has acquired, by agreement of 10th inst., from Messrs. Ludw. Loewe & Cy. Actien Gesellschaft in Berlin their works for the manufacture of Small Arms in Berlin and all the shares in the "Waffenfabrik Mauser" in Oberndorf." As a result, the ammunition company changed its name to DWM and transferred its main offices to Berlin, while maintaining the ammunition factory in Karlsruhe. "The management of the 'Deutsche Waffen- und Munitionsfabriken' has been entrusted to Messrs.: Oberst D. Alfons Castenholz, August Ehrhardt and Alexis Riese. . . . Messrs. Hugo Hauger, Hermann Ratz and Felix Haenisch have been appointed deputy-managers and Mr. Hermann Weisse authorized agent for the firm."[2]

As incorporated into DWM, the Ludwig Loewe factory property in Kaiserin-Augusta-Alee in Berlin-Charlottenberg had an area of 73,000 square meters, more than half of which was under roof, and the Mauser factory property occupied 60,000 square meters, more than one-fourth of which was under roof. The Loewe factory had 4,255 machine tools provided with power in excess of 3,000 horsepower; Mauser's works had 1,800 machines supplied with about 1,000 horsepower. Loewe's manufactory at Kaiserin-Augusta-Alee continued to make small arms after 1896, but the products were now marked with the DWM trademark. Over the next two years production was concentrated at the new facility at Martinkenfelde, also in Berlin-Charlottenberg.

An American visitor to the Loewe works in 1899 commented that "The first plant was on a quite modest scale in the heart of the city." Ludwig and Isidor had lived in a "house facing the street, while the shop was in the rear. Gradually, as the demand grew, shop was added to shop, adjoining property purchased, and the residence converted into office rooms, until at last it became impossible to expand farther on the old ground." To get as much work done on the site as possible, an underground foundry and blacksmith shop had been added. By the mid-1890s, a move was mandatory, and Isidor established the Martinkenfelde works. After the merger with DWM, the Loewe firm continued to manufacture machine tools, electric motors and machines, and electric light and power plants, all of which they installed for their customers.[3] With their financial dealing and empire-building, the Loewe brothers had created an environment in which gifted designers could work and contribute to the state of the art.

HUGO BORCHARDT

Hugo Borchardt's name is well known, but the man is a mystery. He was born (c.1845–1846) in Germany, but exactly where and precisely when is not known. At about age 16, Borchardt emigrated with his parents to the United States, and by 1875 he had become a naturalized citizen. In applying for a job with the Sharps Rifle Company in March 1875, Borchardt summarized his early career for E. G. Wescott, president of Sharps: "I took the superintendence of a shop in the worst condition in Trenton, designed the tools and finished a contract for 5,000 guns to the entire satisfaction of the Co.—Mr. Meecham, who was treasurer of the Pioneer Breechloading Arms Co., hesitated at first in placing confidence in me, owing very likely to my age, I was 24 years old." Afterward, he worked as a foreman at "Singer," which presumably was the Singer Sewing Machine Company. Borchardt subsequently worked for the Winchester Repeating Arms Company of New Haven, Connecticut, in about 1873, and received his first American patent the next summer for a machine to cut lubrication grooves into bullets. The rights under that patent (U.S. patent 153,310, 21 July 1874) were assigned to Winchester. Borchardt worked on the designs of several revolvers at Winchester, but the absence of company documents makes it difficult to prove which, if any, of the eleven prototype revolvers in the Winchester Collection at the Buffalo Bill Historical Center in Wyoming were the work of Borchardt, since Stephen W. Wood and William Mason have also been credited with Winchester designs.

The solid-frame Winchester revolvers are classified by their ejection systems. What is believed to be the earliest type (c.1876) embodied a ratchet device on the right side of the frame that automatically extracted the fired cartridge as the cylinder revolved and aligned the chamber with an ejection port. The extraction mechanism had a pivoting thumb lever that could be used to manually operate the ratchet. This system was designed and patented by an independent inventer, Stephen Wood (U.S. patent 178,824, 13 June 1876; 186,445, 23 January 1877). A second type of revolver, generally called the Borchardt-Wood, embodied a side-swinging, simultaneous-ejecting feature and fired a powerful .38 caliber cartridge.* If Borchardt was actually involved in the design of this revolver, it is likely that it was completed after he left Winchester. A third model, closely patterned after the Colt Single-Action Army revolver and designed by former Colt employee William Mason, appeared around 1882 or 1883. It had the Single-Action Army-type rod ejector mounted beneath the barrel for which Mason had been awarded a patent in 1872 (see chapter 2).[4]

None of these Winchester revolvers was marketed. According to traditional stories, Winchester and Colt arrived at a gentleman's agreement not to enter the other's basic market. Winchester would not manufacture revolvers if Colt dropped its sale of the lever-action Colt-Burgess rifle. Again, there is no evidence of this agreement, but only 6,403 Burgess rifles were made at Colt and all before 1883. It is likely that Borchardt left Winchester because the company was obviously not interested in pursuing the manufacture of his revolver designs. Supposedly, he spent a short time at Colt before his employment at Winchester. In any event, Borchardt moved on to the Sharps Rifle Company in Bridgeport, Connecticut. Sharps, which had been reorganized under E. G. Wescott's direction in 1874, was looking for new ideas and hired Borchardt as factory superintendent on 1 June 1876. Borchardt supplied Sharps with two new products—the

*This caliber was later marketed as the .38–40 Winchester Center Fire (9.7mm) cartridge.

Sharps Borchardt single-shot, dropping-block, large-bore military and sporting rifle, and the Lee Arms Company bolt-action, repeating rifle. In 1876, the Imperial Chinese government ordered 300 Sharps Borchardt rifles, called the Model 1878 in China, and production began that same year (protected by U.S. patent 185,721, 26 December 1876). The company had paid Borchardt $1,855 for the right to manufacture this rifle. As early as May 1879 Borchardt and Charles H. Pond, a member of the Sharps board of directors, traveled to Europe to demonstrate another design, the Lee rifle. Borchardt was never able to pursue the preparation of the rifle drawings and tooling specifications with the Lee Arms Company—Sharps would have manufactured the rifles for Lee—because Sharps fell on financial hard times. Borchardt's threats to resign in September 1880 were overtaken by events when the company suspended production operations in October. A decade later in 1891, Borchardt would visit the United States on behalf of the Lee Arms Company, which had made arrangements for Remington to produce their rifle, but in the fall of 1880 Hugo Borchardt, richer in experience but not in pocketbook, returned to Europe to pursue his career as a small arms design and production specialist.[5]

In about 1882, Borchardt took up residence in Budapest, where he worked for the Fegyver és Gépgyár Részvénytarsaság (Small Arms and Machine Factory Company Ltd.). In Budapest, he came into contact with Karl and Sylvester Krnka, Ferdinand von Mannlicher, and Konrad von Kromar, all of whom were involved in the design of self-loading firearms. For reasons not fully explained, Borchardt left this firm too, in about 1890, and joined the Ludwig Loewe firm. His move to Berlin may have been prompted by Loewe's financial interests in the Hungarian small arms company for whom Borchardt was working. It has been suggested that Borchardt first met designer Georg Luger, who was working for Loewe, when they were both in America on business in 1891. It is also possible, but unsubstantiated, that Borchardt met Ludwig Loewe during Loewe's 1869 tour of American sewing machine manufactories.[6]

Shortly after his arrival at Loewe's factory, Borchardt began to work on a self-loading pistol design. The Deutsches Reich Patent (75,837) for his self-loader was issued on 9 September 1893, and firing models were available in limited quantities by the fall of 1894.* Despite claims by Herr Kosegarten, a director of Ludwig Loewe und Cie., that the production weapon was in every respect like the first pilot model turned out by Borchardt, it must have taken the designer twelve to eighteen more months to fabricate and put the finishing touches on his pistol, called the *Construktion 1893* (C93).[7]

Unlike Schwarzlose and some of the other early self-loading pistol manufacturers, the builders of the Borchardt pistol aggressively pursued the sale of their handguns. Hugo Borchardt and the managers of Ludwig Loewe were quick to make contacts with potential government customers like the Americans. Between June 1893 and January 1896, Lieutenant Robert K. Evans, 12th United States Infantry, the American Military Attache in Berlin, had several meetings with Loewe company representatives including Borchardt and made at least three visits to the factory in Charlottenberg. Evans was presumably the American officer who reported having test-fired the Borchardt pistol in early 1895. A Military Information Division document dated 1894 reported that "He found it a very accurate, close-shooting weapon. The grip being about the center of gravity makes the balance when held in the hand much better than with the ordinary revolver. It seems to possess great endurance." The pistol Evans fired had already been shot more than 6,000 times, and "all its parts fitted as closely and worked as accurately as when first fired." At twenty paces, he had been able to discharge the Borchardt pistol eight times (one magazine) in two seconds, keeping all of his shots on a 460- × 460-millimeter target. Evans reported that the pistol exhibited no significant recoil, but that "only a very few have been made or are being manufactured."[8]

The *New York Times* reported on the same American officer's experiences with the Borchardt pistol. "The Borchardt weapon belongs to that class of firearms in which the opening of the mechanism, the ejection of the empty shells, the cocking, the reloading, and closing are all performed automatically in the recoil of the barrel and breech mechanism." The *Times* reporter was impressed by "the fact that it secretes [hides] in a magazine formed by the grip eight cartridges, which can be thrown off as rapidly as the pistol is discharged." The ingenious nature of Borchardt's pistol was enhanced by the fact that it was the first self-loader to be fully described in the American press. For all the quaintness of his description, the man from the *Times* did file an accurate report on the pistol's mechanism. Upon firing, "the recoil drives the barrel and breech mechanism to the rear, the fork-shaped receiver of the latter being guided in grooves and slots in the lock-case, which forms the upper part of the grip. . . . When the barrel and breech mechanism are driven to the rear by the recoil, the friction rolls off the rear link strike against the curved butt piece and are forced downward, the middle-joint of the toggle is raised, and the breech-block recedes, taking with it the empty shell by means of the extractor. . . ."[9] At 10 meters, a projectile fired by the Borchardt pistol penetrated planks 200 millimeters thick, and as reported to the Ordnance Department it could penetrate a thickness of more than 260 millimeters with a 5.6-gram bullet. That same projectile had also gone through cast steel plate 3 millimeters thick.[10] Compared to existing revolvers, the Borchardt provided an impressive display of firepower.

Interestingly, the U.S. Navy tested the Borchardt pistol before the army. The *Boston Herald* on 22 November 1894 carried the following account of firing trials by a board of Navy officers at Newport, Rhode Island:

> The naval small arms board had exhibited before it today a pistol which is likely to quite revolutionize this sort of equipment in the armies and navies of the world.
>
> It is the invention of an American, Hugo Borchardt, now in Berlin, and was shown for the firsdt time in America.
>
> Georg Luger exhibited the new production, and besides admiring it the members of the board could not help expressing themselves as believing that it had a great future before it.

*Other patents included U.S. 571,260, 10 November 1896; England, 18,774, 6 October 1893; and patents in Austria-Hungary, Switzerland, Belgium, Norway, France, Italy, and Spain.

> It is an arm possible of service for many branches, and the only small weapon in which smokeless powder may be successfully used, this sort of ammunidtion being quite unserviceable in revolvers.
>
> It is after the style of the Maxim smitrailleuse, being automatic in action; receiving its ability to load and extract the empty shell from the recoil of the shot. It is claimed to be the only small weapon capable of doing this continually.
>
> In the exhibition 100 rounds were fired without a hitch. The exhibitor fired 24 shots in 43¼ seconds at a range of 110 feet [33.5 meters], and all were hits. He was not an expert with the piece.
>
> It weighs 2 pounds, 12½ ounces [1247 grams], is 11 inches [280 millimeters] in length. The grip is placed at the centre of gravity, giving it a steadier fire.
>
> Through it runs a magazine capable of holding eight cartridges with nickel jacketed bullets of 7.65 millimeters, about the same calibre as the navy revolver of the present day [.38 Colt New Navy Revolver]. It has great penetration and an effective range of 500 meters.
>
> A light adjustable stock may be affixed, making for all practicable purposes a carbine for cavalry.
>
> The cartridges are of the Luger rimless type, which have caused such a sensation among gun men during the present week in the small arms tests.[11]

Borchardt, Luger, and the Loewe firm did their best to promote their pistols in America. Descriptive articles appeared in *American Machinist* (14 February 1895) and *Scientific American* (3 August 1895) in an attempt to educate the public and the army as to the operation of the self-loader.[12] But most important, the Loewe team sought to have the pistol tested by United States ordnance officials. By the time tests had been arranged, Ludwig Loewe and Companie had merged with the Deutsche Waffen- und Munitionsfabriken (DWM).

Just how the tests of the Borchardt C93 pistol were arranged is unknown, but on 16 October 1897 Hans Tauscher, the DWM representative in the United States, wrote to Chief Of Ordance General Daniel W. Flagler to tell him that a Borchardt carbine together with 500 rounds of ammunition would be delivered to Springfield Armory on 20 October. An ordnance testing board (Captain J. Rockwell, Jr., Captain C. W. Whipple, and Lieutenant T. C. Dickson) conducted a series of tests at the armory, which were summarized in their 23 December 1897 report. Herr Tauscher appeared before the board and explained how the pistol-carbine operated. To demonstrate the basic safety of the lock mechanism, he removed the barrel and receiver from the grip assembly. Holding the barrel in one hand, he depressed the sear and allowed the striker to fly forward and fire a cartridge. In the absence of recoil against the camming surfaces of the grip assembly, the toggle bolt mechanism remained locked. In addition to this little demonstration, Tauscher also displayed and fired a fully automatic version of the Borchardt carbine "of the same pattern as that submitted to the Board for testing" but with a modification to the toggle arranged "to operate the sear so that when the first Cartridge was inserted in the chamber and the trigger pulled, 8 shots were automatically fired in about ½ second." In this simple manner, the first machine pistol was demonstrated in the United States.

Having examined the Borchardt, the board reported that exclusive of the magazine and stock it had 70 parts (including 7 screws, 18 pins, studs, and rivets, 7 flat and 5 coil springs), and at 16 meters the projectile had a velocity of 395.2 meters per second. Forty seconds were required to disassemble the pistol and 140 seconds to reassemble it. In the firing tests, the pistol was shot first as a carbine with the target (1.83 × .61 meters) being placed at 30.5 meters. In the first round, 40 shots were fired in 68 seconds with 39 hits; second round results were 40 shots in 45 seconds with 35 hits. Fired as a revolver, 32 shots were expended in 38 seconds with only 12 hits. After 262 rounds, the Borchardt pistol had to be disassembled for cleaning because unburned powder had accumulated in the chamber and prevented complete feeding of the cartridges into the chamber. Penetration results were similar to those reported from Berlin. The target was a series of 25.4-millimeter white pine planks with 25.4-millimeter airspaces between them. At 22.9 meters, 10 planks were penetrated; at 68.6 meters, 7.5 planks; and at 457 meters, 3.5 planks. (In 1897, wooden, horse-drawn vehicles and wooden buildings were still the norm so penetration of wood was a valid means of evaluating projectile performance.)

Intentionally defective cartridges were also shot to deter-

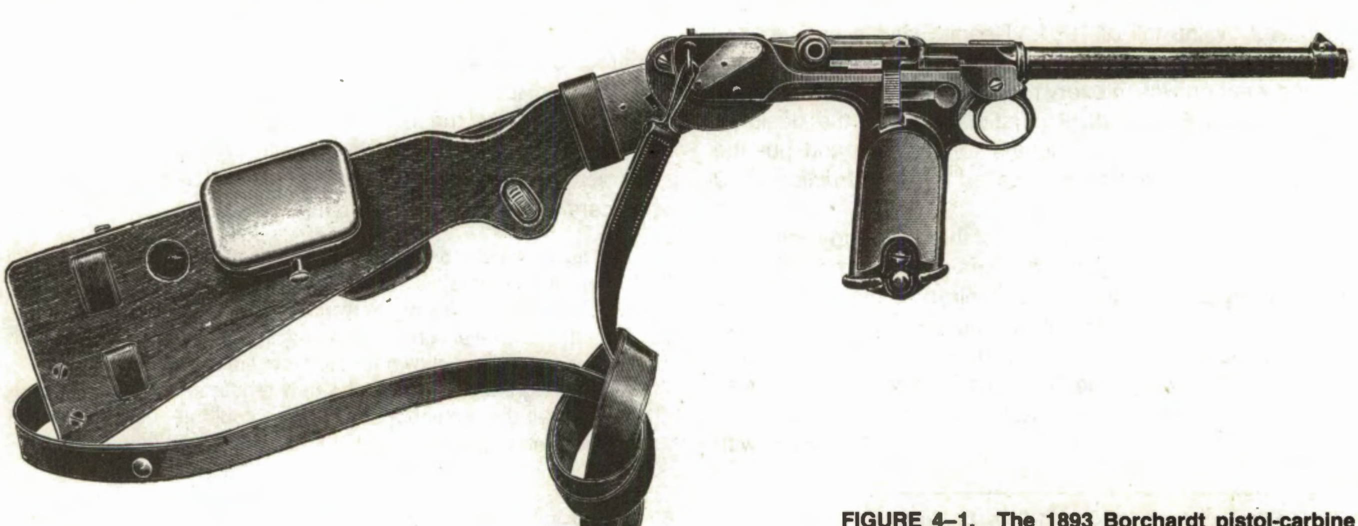


FIGURE 4–1. The 1893 Borchardt pistol-carbine of the type tested by the U.S. Army in 1897. (*Smith*)

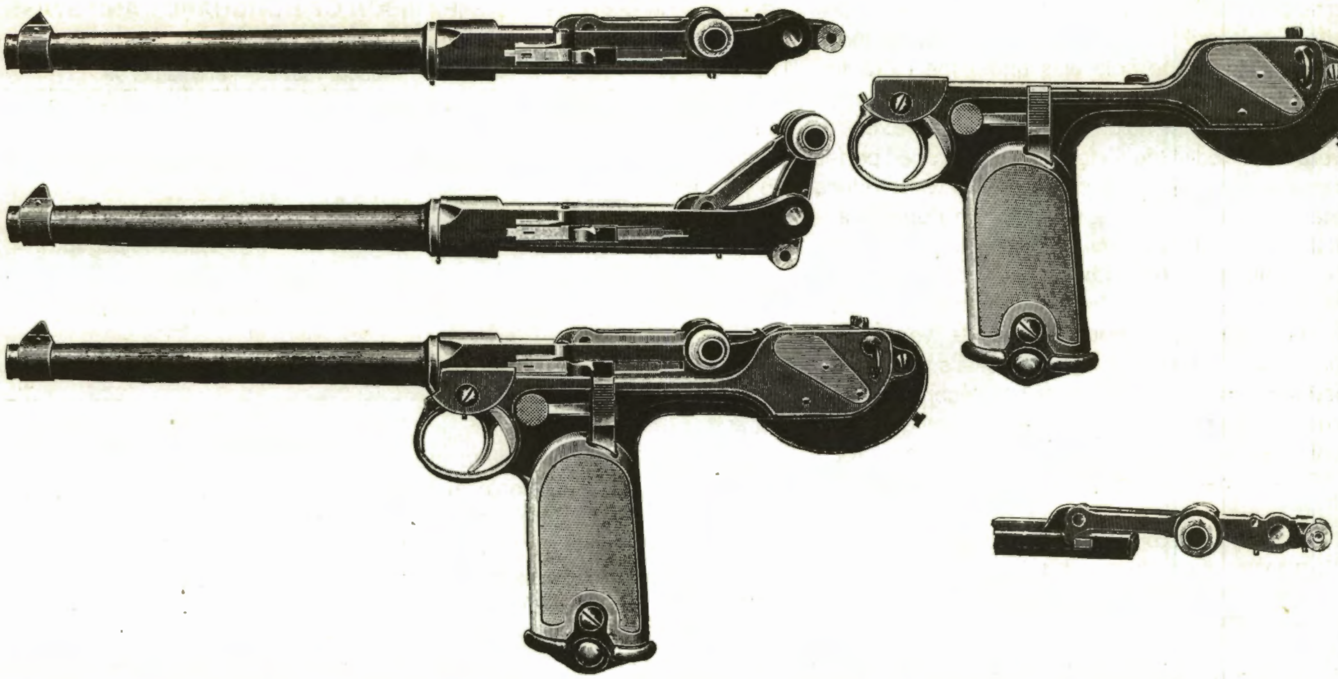


FIGURE 4–2. The 1893 Borchardt pistol, assembled and disassembled to illustrate the barrel and bolt assembly and the receiver (frame) assembly. The arrow indicates the camming ramp, which the toggle must strike to unlock the bolt mechanism. (*Smith*)

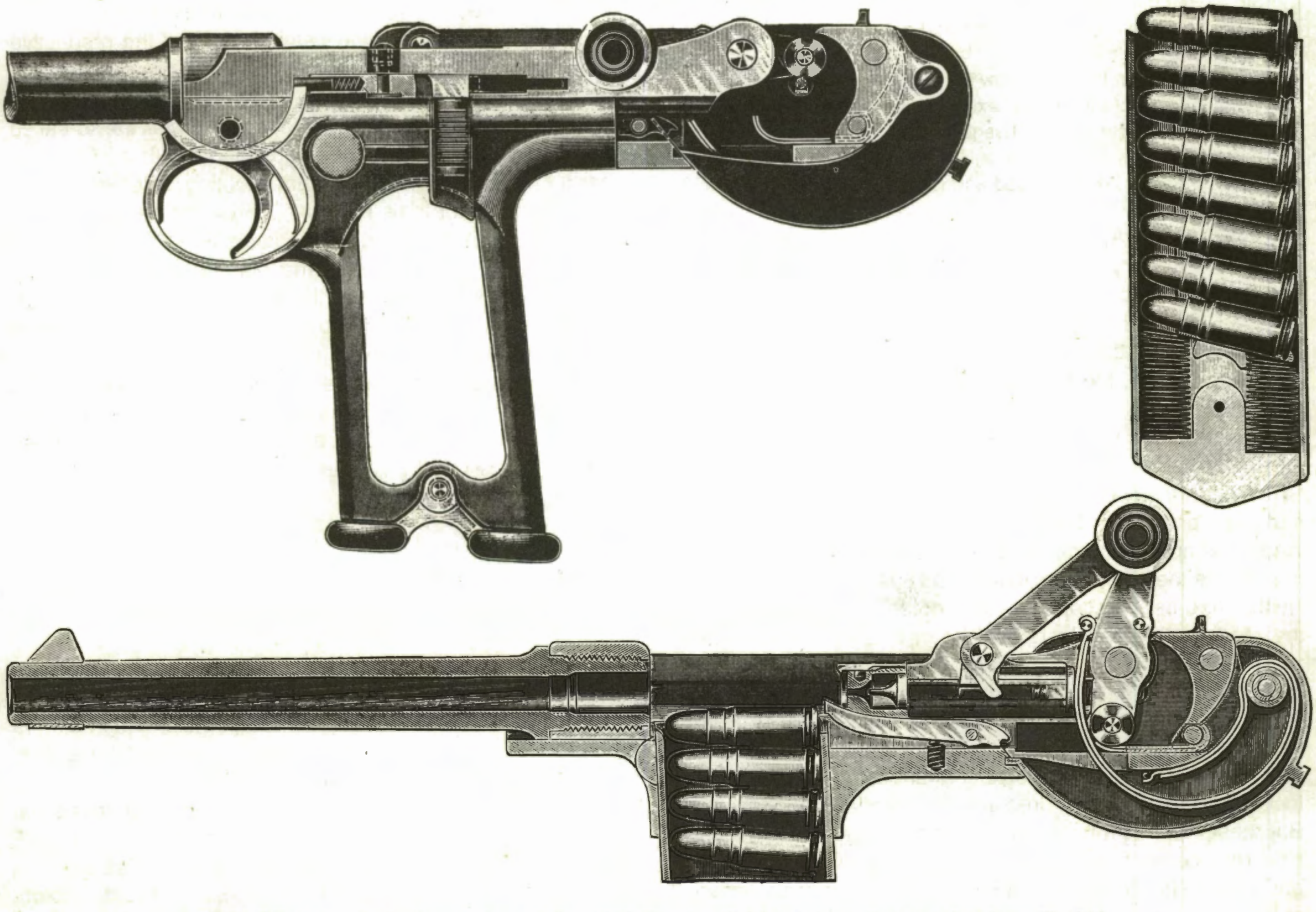


FIGURE 4–3. A sectional view of the 1893 Borchardt pistol operating mechanism. (*Smith*)

mine potential damage to Borchardt's design. One cartridge with a hole drilled just in front of the extractor groove was placed so that the hole was under the extractor. "The extractor was broken and the front fragment was blown out of the bolt, otherwise no damage was done." Excessive charges were also fired in the pistol, and it functioned perfectly without damage. It performed satisfactorily with reduced powder charges, too. Durability was proven during the endurance test; 997 rounds were fired in 2 hours, 47 minutes, with only three failures to feed (those were due to the bullet moving back into its case so that the mouth of the case caught on the chamber). One thousand rounds were fired without interruption. By this time, the projectile's velocity at 16 meters had increased to 400 meters per second due to barrel erosion. The Borchardt also performed well during the dust and rust tests, and a total of 2,448 rounds were fired.

The ordnance board's findings were positive.

> 1st,—That the construction and action of this pistol show a workmanship of the highest order.
> 2nd,—That the accuracy and penetration of this weapon raise it, ballistically, above the revolver class, but the rapid decrease in penetration as the range increases, due to the lightness of the bullet, restricts its efficiency to ranges not over 500 yards.
> 3rd,—That the method of obtaining automatic action in this Arm is ingenious, safe, practically certain and comparatively simple.
> 4th,—That its small calibre, and exceptionally light bullet make its "stopping effect" questionable, especially for a cavalry weapon.
> 5th,—That the Borchardt Automatic Pistol-Carbine stood all the tests, to which it has been subjected by the Board, in a highly satisfactory manner.
> The results of this trial show the Borchardt Automatic Pistol-Carbine to be of the highest excellence as a target arm but, as its suitability for the rough usage of the Military service can be determined only by actual test, the Board recommends that a limited number be purchased and issued for further trial.

But Colonel Alfred Mordecai, commanding officer at Springfield Armory, for some unrecorded reason would not approve the purchase of even a limited number for field tests.[13] Despite subsequent efforts by Tauscher and associates to interest the Ordnance Department in a small lot of Borchardt pistols, the U.S. Army did not conduct any additional tests.[14]

Borchardt and his colleagues also presented the C93 pistol to the Swiss Kriegsmaterialverwaltung (KMV, the ordnance department). As might be expected, the Swiss military had been one of the first in Europe to be interested in self-loading weapons and had established a commission in 1895 to evaluate the 1894 Mannlicher and 1894 Bergmann pistols. Neither had been acceptable as a potential replacement for the Modell 1882 revolver. Two years later in the summer of 1897, a new commission was convened at the Eidgenössische Munitionsfabrik at Thün. This group of officers had planned originally to evaluate the Mannlicher, Bergmann, Borchardt, and Mauser (C96) pistols against the Modell 1882 Ordonnanzrevolver, but after considering the 1895 test report the group test-fired only the Borchardt and Mauser. But these self-loaders failed to satisfy the Swiss as acceptable replacements for their revolver—both were too heavy and bulky. The Borchardt's ammunition was its major strong point.

TABLE 4-1 COMPARISON OF BORCHARDT AND SWISS REVOLVER AMMUNITION

	Modell 1882	*Borchardt C93*
Bullet weight (grams)	**6.8**	**5.5**
Powder weight (grams)	**.2**	**.45**
Poweder	**White**	**Walsrode Jagdpulver**
Muzzle velocity (meter/sec)	**221**	**410**
Muzzle energy (joules)	**166**	**463**

After studying the results of the Swiss trials, Borchardt and the people at DWM, including designer Georg Luger, designed an improved handgun for Swiss authorities. On 5 October 1897 this modified Borchardt was pitted against the Bergmann and Mannlicher self-loaders. The improved Borchardt was smaller and lighter with a different kind of recoil spring. Whereas the original C93 weighed 1,310 grams with an overall length of 350 millimeters, the new design weighed about 1,000 grams and was 272 millimeters long. It is believed that this pistol was not the Borchardt-Luger that subsequently appeared in 1898, but a distinct model, with Luger's trigger and safety improvements (Deutsches Reich Patent 109,481, 30 September 1899). As John Walter has demonstrated in his book *Luger,* the evolution from C93 Borchardt to 1900 Luger was a complicated path, and the respective roles of Hugo Borchardt and Georg Luger are still not fully understood.

In 1898, DWM initially submitted to the Swiss the so-called Improved Borchardt but then supplanted it with the first Borchardt-Luger design before actual shooting tests began. The 1898 Swiss pistol trials involved the Bergmann-Pistole No. 3 (1898 model), the Bergmann-Pistole No. 5 (1897 model), the Krnka-Roth 1898 model, the Mannlicher Automatische Repetier-Pistol Model 1896, the Mauser C96, and the Borchardt-Luger. When the firing trials ended on 28 November 1898, the Swiss had ranked all the contenders and put Borchardt-Luger on top, followed by Krnka-Roth, Mannlicher, Bergmann, and Mauser. The Borchardt-Luger was by far the best, Mauser by far the worst, and all the others were clumped together in the middle and labeled "adequate."

GEORG LUGER

Borchardt's codesigner, Georg Luger, was born at Steinach in the Austrian Tyrol. He became a cadet in the Austro-Hungarian army in 1865 at age 16, but his military career was a short one, leaving the army in 1872 to marry. After a short stint with the Nordosterreichische Eisenbahn (North Austrian Railway System), Luger became involved with Ferdinand von Mannlicher in the development of firearms. In about 1875 Mannlicher and Luger collaborated on the design of a five shot gravity-feed device for the Austrian Werndl-Holub-Spitalsky service rifle. Over the next twenty years Luger con-

tinued to experiment with rifle designs, both bolt-action repeaters and self-loaders. During this period, he visited the United States on at least two occasions (1886 and 1890), and in 1891 he joined the Ludwig Loewe firm. Luger was more of an extrovert than his colleague Borchardt and often traveled to promote the company's handguns. He was on the scene during the 1897 to 1898 Swiss trials, working with the authorities to improve the design. After the turn of the century, he made many trips to America to promote his self-loading pistol. After the creation of Deutsche Waffen-und Munitionsfabriken (DWM), Luger joined the new group, while Borchardt remained with Ludwig Loewe und Companie.

Borchardt and Luger both owned sizable holdings in DWM, but Borchardt only infrequently consulted with that company on firearms designs. If the patent records are indicative of his interests, Borchardt became involved with the development of gas burners and related industrial equipment during the early years of the new century, but after 1911 he seemingly renewed his interest in firearms.

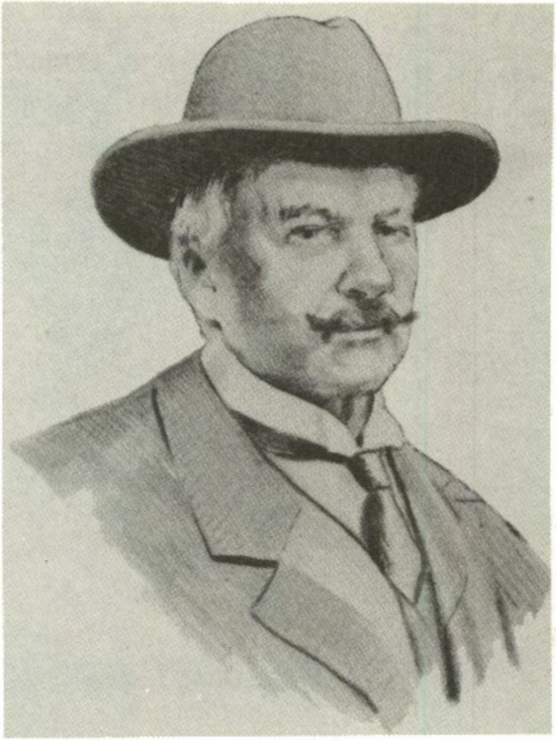


FIGURE 4–4. Georg Luger (1849–1923), the codesigner of the Borchardt-Luger Parabellum pistol and one of its leading proponents. (*Chinn*)

BORCHARDT-LUGER MODELS

The Borchardt-Luger

The DWM self-loading pistol tested by the Swiss Kriegsmilitarverwaltung (War Department) in 1898 was called the Versuchsmodelle III (Experimental Model 3) by the Swiss, thereby distinguishing it from the Borchardt C93 (Versuchsmodell I) and the Improved Borchardt (Versuchsmodell II). The Versuchsmodell III was typical of subsequent Parabellum pistols in that the barrel and receiver assembly recoiled about five millimeters before the toggle cam (gripping point for cocking the pistol) struck the camming surface or ramp ("ears") on the frame assembly. As the toggle cam struck the ramps, the toggle joint was unlocked, and the links folded upward in jackknife fashion. On the forward stroke, the toggle bolt was pulled down into the locked position by the spring housed in the receiver assembly behind the magazine well. Also during the closing stroke, the striker-type firing pin was held to the rear in the cocked position. Depression of the trigger activated the complicated linkage (housed in the trigger sideplate), which in turn depressed the sear mechanism to release the striker.

Technically, the 1898 Borchardt-Luger was a significant design because it safely utilized the relatively powerful 7.65mm Borchardt cartridge, even though it was smaller and lighter than the C93 Borchardt. The Model 1898 had two shortcomings, however. It required consistently loaded ammunition to function reliably, and the spring used to close the toggle bolt was not always strong enough to lock the weapon, especially when the pistol was dirty or rusty. The major difference between the 1898 and later designs was the absence of a mechanical safety at the rear of the receiver assembly. That lever-type safety was added after 1899. As tested by the Swiss in 1898, the Borchardt-Luger had only a grip safety. The 1898 Versuchsmodell III (and subsequent models dating from 1899, 1900, 1902, and 1904) had a toggle locking device that prevented the pistol from unlocking if the bolt tried to rebound during firing. It was mounted on the right-side toggle grip, making it necessary for the toggle to be pulled slightly to the rear before it could be pulled upwards and open. After 1906, the lock was eliminated, and the toggle could be opened by grasping the knurled grip points and pulling directly

TABLE 4-2 EXPERIMENTAL DWM PISTOLS

	Borchardt C93	*Improved Borchardt*	*Borchardt-Luger 1898*	*Borchardt-Luger 1899*	*Swiss Model 1900*
Caliber (mm)	7.65 × 22	7.65 × 22	7.65 × 22	7.65 × 22	7.65 × 22
Overall length (mm)	350	272	257	237 257	237
Barrel length (mm)	190	N/A	140	120 140	120
Weight (grams)	1310	1000	990	900 915	890

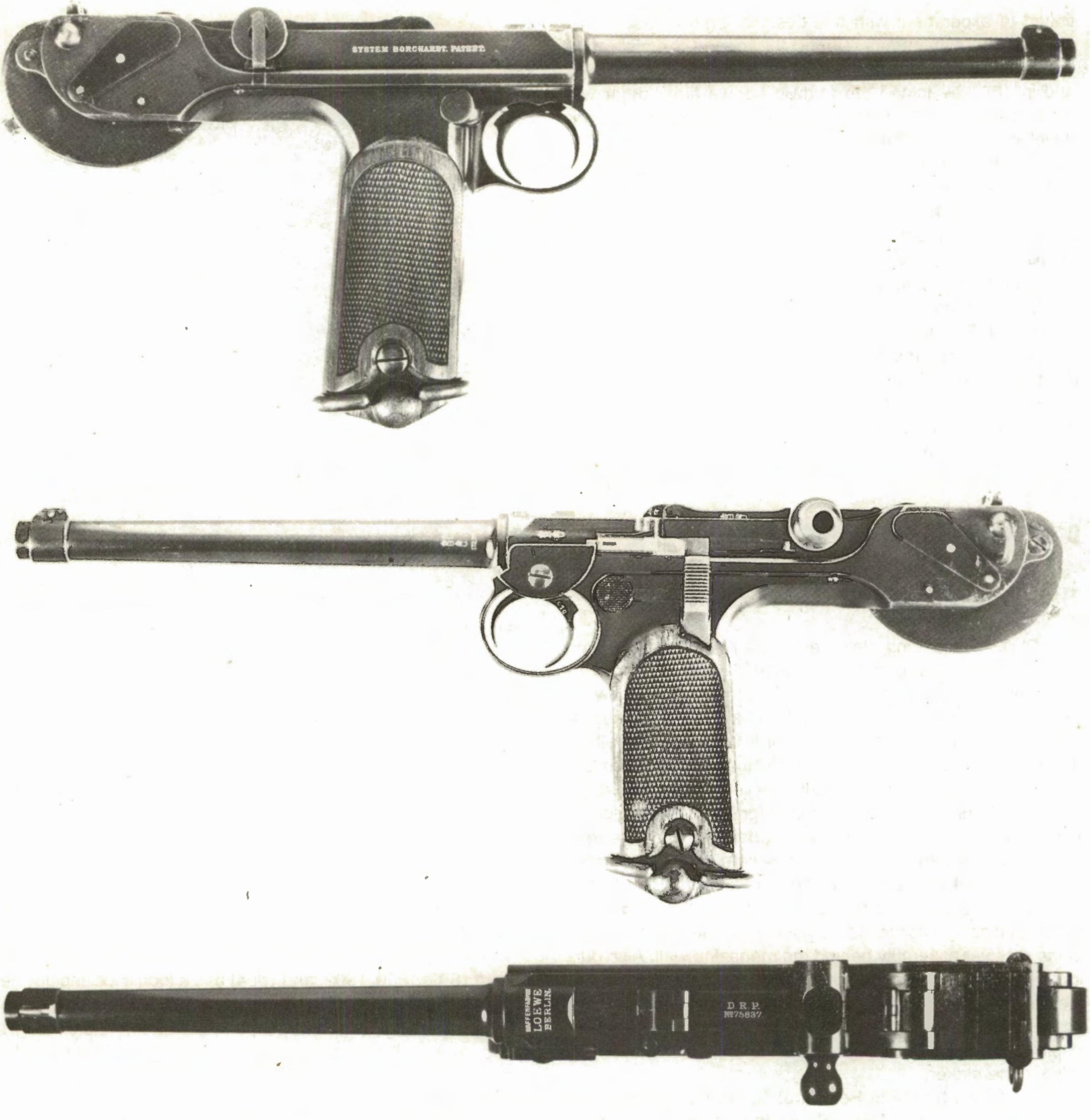


FIGURE 4–5. The 1893 Borchardt pistol as manufactured by Ludwig Loewe. (*Krcma*)

upwards. Only five 1898 Borchardt-Luger pistols were fabricated; numbers four and five went to the Swiss for testing, and the other three remained at the DWM factory.

In May 1899, the Swiss reconvened the commission that had met in November 1898 and instructed them to examine six self-loading pistols: a new version of the Borchardt-Luger, the Krnka-Roth, the Mauser C96, the Mannlicher Model 1900, a Fabrique Nationale Browning, and a design (still on paper) by Albert Huff, a German inventor (Deutsches Reich Patent 96,757, 9 September 1896). The Krnka-Roth and Mauser were rejected outright because they were still of the same pattern tested in 1898, and none of the other designs could compare with the Borchardt-Luger for performance or level of technical development.

Georg Luger had discussed the DWM Borchardt-Luger design with Oberst von Orelli, the chairman of the Swiss test committee, in February 1899, so the pistol was accordingly tailored to the needs of the government. The Versuchsmodell 1899 had a manual lever safety to supplement the grip safety, and the breech block had also been redesigned, a bolt hold-open device having been added and a visible sear bar substituted for the old internal sear. Although lighter than the

Versuchsmodell III (1898), the 1899 pistol was still too heavy to suit the Swiss. But after successful trials that spring, the Swiss Ordnance Department ordered 20 Versuchsmodell 1899 Borchardt-Lugers for field trials at a price of 100 Swiss francs each ($19.30). The Swiss soldiers, who were chosen to use the Borchardt-Luger in the field reported in March 1900 that the improved design was highly desirable. The military in turn recommended to the Bundesrat that the pistol be adopted. On 4 May 1900, the parliament agreed and standardized it as *Pistole, Ordonnanz 1900, System Borchardt-Luger.* An initial lot of 2,000 were delivered by DWM in early 1901 at a unit cost of 62 Swiss francs ($11.96), which included an import duty of 4.6 francs per unit. Although original plans called for the 1900 Pistole ultimately to replace all the army's 10.4mm Ordonnanzrevolver 1878s and their 7.5mm Ordonnanzrevolver 1882s, the self-loaders' issue was generally limited to officers.[15]

U.S. Army Testing

A 1902 U.S. Army intelligence report on the introduction of the Borchardt-Luger into the Swiss service noted that a "spirited controversy" had arisen over the "qualities of the recently adopted model-1900 automatic pistol (Parabellum)." The authors of the report got the general impression that "in changing from a revolver to a pistol the troops did not perhaps receive adequate instructions as to the management of the latter." As a result, there had been a number of accidents with the Borchardt-Luger pistol, "which were rather due to the ignorance of the possessors regarding the weapon than to any inherent defect in the weapon." Local armorers were also making unauthorized and dangerous changes to the pistol, which prompted the chief of the artillery to issue an order prohibiting any local modifications. There was to be considerable debate on both sides of the Atlantic over the suitability of self-loading pistols for issue to enlisted men. The experience of the Swiss army with the Borchardt-Luger pistol and the Belgians with their Browning self-loader were closely monitored by several governments that were contemplating the adoption or testing of this new kind of weapon.[16]

Between 1901 and 1907, the Borchardt-Luger pistol was tested several times by the U.S. Army in various models and calibers. It was first officially brought to the attention of the army by Captain William H. Beehler, USN, while he was acting military attache in Berlin. On 11 September 1900, Beehler wrote to the Adjutant General describing some experiments he had witnessed "with the Borchardt-Luger Automatic Pistol at the Factory Loewe & Co. in Charlottenburg." He was convinced that the new pistol was "far superior" to any other handgun he had seen. While much admired for its technical excellence and elegance, this pistol was not favorably received by the American officers who tested it in the field.

On 9 March 1901, Hans Tauscher of DWM met with members of the U.S. Army Board of Ordnance and Fortification, and together they made arrangements for the testing of two 7.65mm Model 1900 Borchardt-Lugers. The tests were carried out at Springfield Armory by three officers (Major John E. Geer, Jr., Captain Frank Baker, and Captain John T. Thompson). During the trial, a total of 2,000 rounds was fired, with a number of misfires taking place due to insufficient firing pin protrusion, spread magazine lips (which did not hold the cartridge very well), and some poorly made cartridges. Toward the end of the tests, the bolt hold-open device was worn to the extent that it could not hold the bolt to the rear when the last shot in the magazine had been fired. Although the pistol passed the dust test without any difficulty, the rust test stopped it dead.

In evaluating the Borchardt-Luger, the officers noted that "the parts of this pistol are in themselves somewhat complicated in shape and would be expensive to manufacture," but the pistol "as a whole, is not a complicated arm, and is simple to dismount for cleaning and oiling." Therefore, the testing board recommended that a quantity of the DWM pistols be purchased and issued to the field for trial. As the officers remarked, there was considerable divergence of opinion among U.S. Army officers over the advisability of adopting

FIGURE 4–6. A Deutsche Waffen- and Munitionsfabriken (DWM)-manufactured 1893 Borchardt pistol. (*Visser*)

FIGURE 4–7. The 1898 Borchardt-Luger Versuchsmodell III (serial no. 5), as tested by the Swiss Army in November 1898. This pistol had a 140-millimeter barrel. (*Waffenfabrik Bern*)

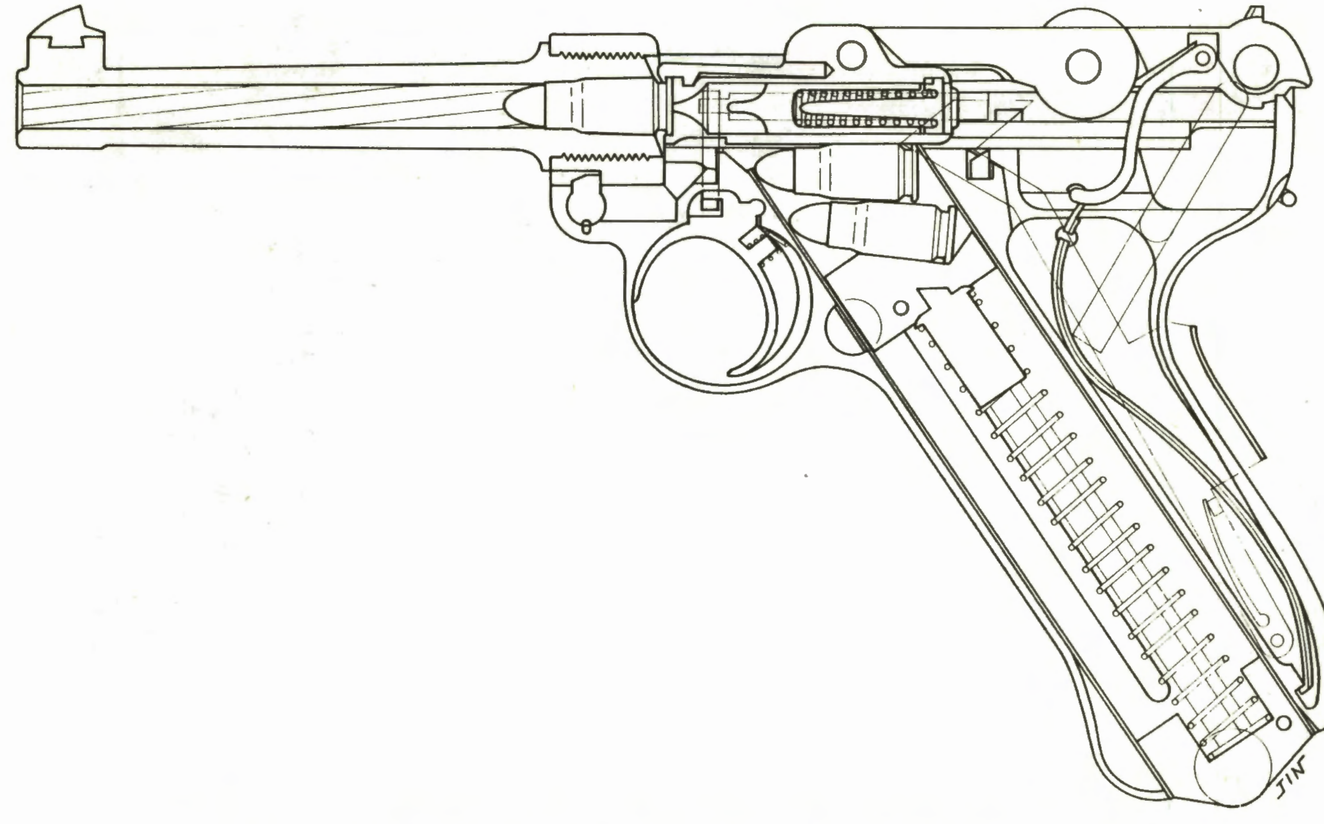


FIGURE 4–8. A sectional view of the 7.65mm Swiss Model 1900 Parabellum pistol. (*Jimbo*)

a self-loading pistol, especially concerning its suitability as a side arm for enlisted men. The men evaluating the new handgun wanted to ascertain further the army's opinions on four points.

(a) The advantages and disadvantages of automatic pistols as compared with the revolver.
(b) The advantages and disadvantages of this particular arm as compared with the revolver.
(c) The advantages and disadvantages of this pistol as compared with such other automatic pistols as the officer may be familiar with.
(d) The suitability of automatic pistols for the use of enlisted men . . . or would it be advisable to issue them for the use of officers and non-commissioned officers.[17]

On 16 April 1901, Colonel Frank H. Phipps, commanding officer at Springfield Armory, was authorized to negotiate with Tauscher to acquire 1,000 Borchardt-Luger pistols and a suitable quantity of ammunition. The price was fixed at $14.75 per pistol with shipping and $14.00 per 1,000 cartridges. The first 800 pistols with 200,000 rounds of ammunition left Hamburg on 18 September 1901, arriving in New York on 26 October, with the remaining 200 reaching the States three days later.* Following inspection at Springfield Armory in December, the Borchardt-Lugers were distributed to the field in February and March 1902: 1 to Rock Island Arsenal as a pattern for a holster (23 January 1902); 10 to the U.S. Military Academy, West Point, New York; 15 to the U.S. Musketry School, The Presidio, San Francisco; 10 to Fort Hamilton, Brooklyn, New York; 40 to the Cavalry Board, Fort Riley, Kansas; and 625 to cavalry units in the field. Over the next two years, the Ordnance Department received many reports on the new European self-loader.

In April 1902, Captain C. B. Sweezey, commanding Troop B, 13th Cavalry at Fort Robinson, Nebraska, was one of the first officers to report on his experiences with the Borchardt-Luger. He believed that it possessed "some advantages as compared with the revolver now used." "Greater rapidity of fire action, and it seems to me it is better balanced and lends itself to more accurate fire when shooting without deliberate aim." Captain Sweezey was of the opinion that extra magazines were a necessity because "its magazine is too difficult to load for a mounted man and if mounted on a restless horse or if in cold weather when the hands were numb with cold it would be practically impossible to hold down the spring." Furthermore, he believed that the Borchardt-Luger was suitable for issue to enlisted men: "Its mechanism is simple and I believe its action renders it safe."[18]

THE LUGER AUTOMATIC PISTOL A year later, in May, Georg Luger visited the United States and brought a 9mm version of his pistol with him. As a result arrangements were made to test the 9mm model. Luger had created a new cartridge, 9 × 19mm, which became known universally as the 9mm Parabellum, in reply to complaints about the poor striking power of the 7.65mm projectile. On 21 May 1903, Luger

*The Borchardt-Lugers purchased by the U.S. Army are generally called the American Eagle Lugers (unofficial designation) because of the American-style eagle stamped over the chamber on the barrel extension.

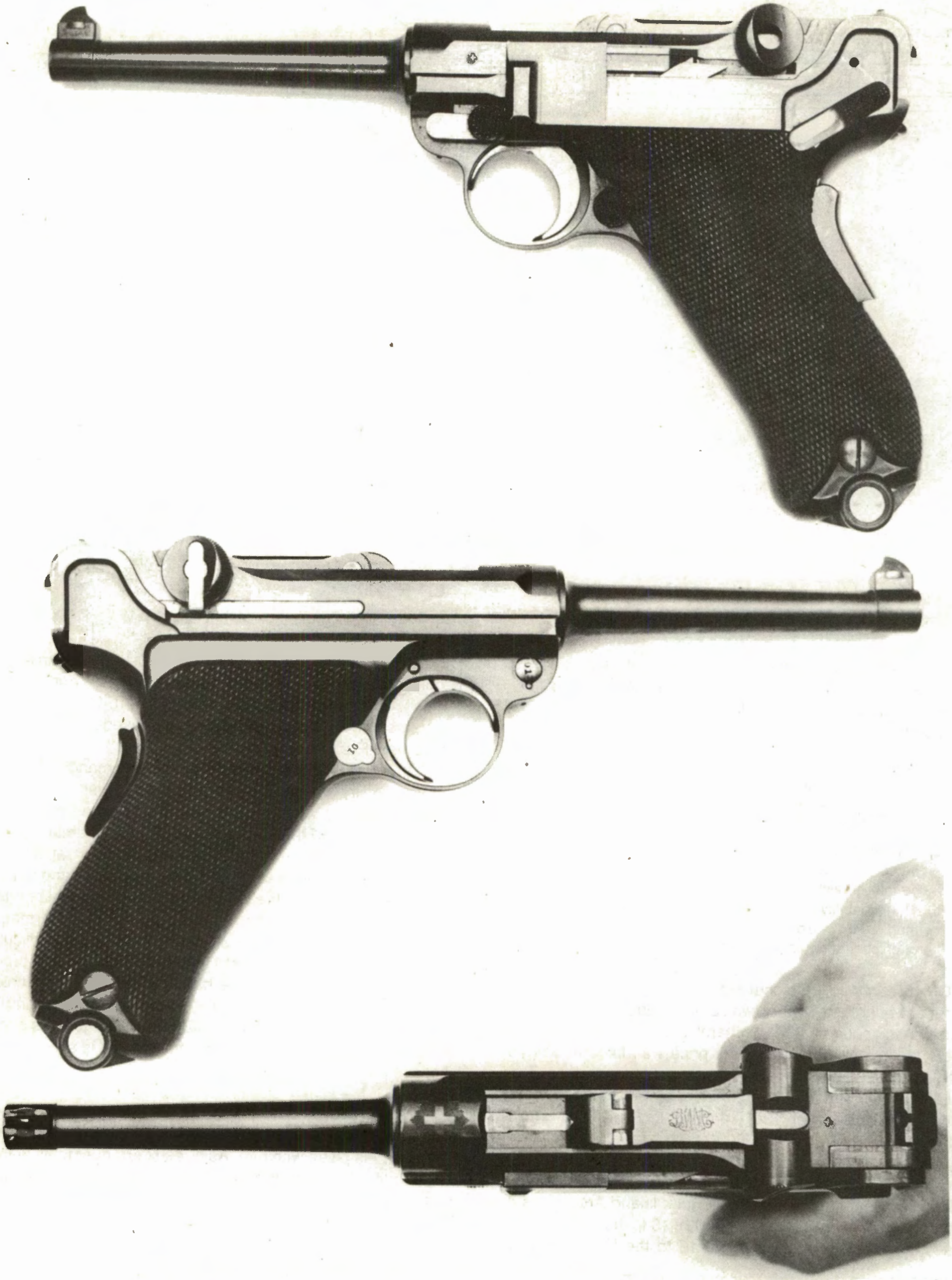


FIGURE 4–9. The first 7.65mm Swiss Ordonnanzpistole 1900 (serial number 01). (*Visser*)

and Tauscher appeared before a board of officers (Lt. Col. J. Pitman, Captain John T. Thompson, and Captain W. S. Pierce) at Springfield Armory to demonstrate 7.65mm and 9mm Luger pistols in a variety of barrel lengths (7.65mm with 100-, 120-, and 175-millimeter barrels, 9mm with 100-, 120-, and 148-millimeter barrels). These pistols had improved extractors, stronger ejectors, firing pins, and recoil springs, wider grip safeties, modified safety levers, and altered front sights. The only difference between the 7.65mm and 9mm pistols was the barrel. Luger also brought along some experimental cartridges that were more heavily loaded and some in which a truncated cone-type projectile was substituted for the round-nose bullets used previously. Luger did all of the accuracy firing during these demonstrations and in so doing justified his reputation as an excellent shot. In both the 7.65mm and 9mm models, the 120-millimeter barrel gave the best results.

The most important aspect of these trials was the test made to determine the wounding effect of the projectiles. By 1903, military officials around the world were becoming more schooled in the study of wound ballistics, and board member John Thompson was one of the leading students of this topic. Therefore, "in order to compare the striking effects of the bullets it was arranged to fire one shot from a pistol of each caliber into plastic clay and observe the cavities produced." The clay was mixed with water until it was just stiff enough to retain a molded shape. Then it was put into an open-top box 305 × 305 × 660 millimeters that had a hole on one end into which the pistol was fired. Each cavity was then filled with plaster of paris. Before the firing tests began, bullet energies were also determined. From pistols with the 120-millimeter barrel, the 7.65mm projectile propelled by a .34-gram powder charge produced 498 joules, and the 9mm projectile propelled by a .35-gram powder charge produced 430 joules. Thus, the 7.65mm projectile had a greater "striking energy" at 15.24 meters and produced a much larger cavity. "The results of the limited experiments would therefore, if considered alone, lead to the conclusion that the disabling effect of the smaller bullet was not only equal to that of the larger, but greater." The effects produced on clay and living flesh, however, cannot be assumed to be alike. The explosive effect of a small-caliber, high-velocity bullet in cavities filled with semi-fluid masses like the skull and the abdomen was well known, but "as far as can be ascertained by the Board this bullet does not produce in ordinary flesh the enlarged cavity obtained in the clay." In comparing the two calibers, board members were not concerned with hits to vital areas because either bullet would prove fatal in that case. They wanted a projectile that would "disable and stop a man when hit in a non-vital part, and in the case of such wounds past experience has shown that the heavier bullet is the more effective." Conclusive results could be obtained only "by practical experiments upon living animals, with competent medical assistance," but pending such tests the Board offered "the opinion that Luger cal. 9m.m. is better suited to our service than the cal. 7.65m.m."[19]

In April 1904, 50 9mm 1902 pattern Luger pistols (serial numbers 22,401–22,450) arrived from Berlin with 25,000 cartridges for testing by the Cavalry and Field Artillery Boards at Fort Riley, Kansas. The Cavalry Board reached the following conclusions:

> 1. The Luger automatic pistol, Cal. 9mm., is an accurate weapon at the distances at which it was tested.
> 2. The jamming of cartridges, which occurred so frequently, completely nullified the good qualities of the pistol and renders it practically useless.
>
> The Board therefore does not recommend the adoption of the Luger automatic pistol, in its present state, for the service.

The Field Artillery Board reported similarly:

> As a result of the tests made, the board is of the opinion that the Luger automatic pistol is not as good a service weapon as the Colt's revolver now in use because of the following defects developed in the Luger:—
> I. Liability to jam.
> II. Cartridges miss fire.
> III. Both hands are required to commence firing and this applies not only for the first shot, but also after the pistol had jammed or missed fire.
> IV. Because of this necessity of using both hands to commence firing, the first shot cannot be fired quickly.
> V. Because of the fact that the mechanism is complicated and can be easily gotten at (no tools being required for the purpose) it is liable to get out of order through unnecessary handling.

TABLE 4-3 LUGER AMMUNITION TESTED MAY 1903, SPRINGFIELD ARMORY

Caliber	*Barrel Length (mm)*	*Bullet Weight (grams)*	*Powder Charge* (grams)*	*Velocity (meters/second) at 15.24 m*	*Penetration of white pine (mm)†*
7.65	100	6	.33	339	191
7.65	100	6	.34	390	229
7.65	120	6	.33	355	
7.65	120	6	.34	407	
7.65	175	6	.34	438	
9	100	8	.35	315	197
9	100	8	.38	334	229
9	120	8	.35	328	
9	120	8	.38	344	
9	148	8	.35	336	
9	148	8	.38	357	

*Rotweil nitrocellulose pistol powder.
†Only tested with short barrels.

VI. The necessity of taking a pistol apart arises seldom, therefore this advantage that the Luger pistol has is more apparent than real.[20]

Reports from the field were no more encouraging. P. Francis Crosby, an engineer officer attached to the Office of Lighthouse Engineer in Manila in the Philippine Islands delivered his opinion in April 1905. The chief advantage of the Luger over the revolver, as he saw it, "appears to be that it will fire a greater number of shots from a single loading, and that it can be reloaded more easily and rapidly if one has on hand a number of charged clips." In addition to the familiar complaint about magazine loading difficulties, Captain Crosby commented, "the chief disadvantage of this pistol appears to lie in the number and complicated nature of its parts which I believe make it unsuitable for use by enlisted men." Even officers and noncommissioned officers would have to take special care to understand the weapon, Crosby cautioned, and "without such knowledge a man could not have the same confidence in this pistol as in the much simpler revolver, nor could he put it together properly after cleaning, discover quickly the cause of any failure to operate, or take promptly the necessary steps in case a cartridge sticks or does not explode." To prove his point, Crosby told a tale on himself. After first using his issued Luger, he put it away for a few months. "On taking it out again I did not notice that the thumb lever which holds in place the removable plate was down instead of up, the result being that when I attempted to cock the pistol the plate fell out." It took him ten minutes to figure out how to reassemble it. It was an embarrassing story, but it proved his point.[21] Pistols like the Luger were just advanced enough compared with most revolvers to make them a bit forbidding, even to individuals who would not normally be intimidated by a self-loading pistol.

TABLE 4-4 1906 LUGER PARABELLUM PISTOL PRODUCTION

Model	*When Produced*	*Total*
Commercial		ca. 33,650
Russian commercial	c. 1906–07	1,000
Bulgarian military	1906–07	ca. 1,250
Brazilian military	1908–10	5,000
Chinese military	pre–1910	500
Dutch Indies military prototypes	1905–06	10
Dutch Indies military (DWM)	1911–14	4,000
Dutch Indies military (Vickers)	c. 1921–26	6,181
Portuguese army	1909–10	ca. 5,000
Portuguese navy	1910–11	ca. 1,000
Swiss military (DWM)	1906–14	10,215
Swiss military (Waffenfabrik Bern)	1919–28	12,385
Swiss experimental models	c. 1912	20

In 1906, the Ordnance Department recalled all the Lugers in the field and disposed of about 700 of them at public auction. Francis Bannerman, the military surplus dealer, purchased this lot of pistols from the army at $10.00 each, and over the next decade his company sold them at prices ranging from $18.45 to $19.85. Rock Island Arsenal-made holsters sold for ninety-five cents each. The remainder of the "American Eagle" Lugers was sold by the Ordnance Department during the summer of 1910. Letters sent out to prospective purchasers noted that the price of the pistols was set at $10.00 each FOB Springfield Armory and that "these pistols have been in the service, but were cleaned and repaired, and are now practically as good as new."

The Luger-type pistol was tested again in 1907 when DWM and Luger submitted a .45 caliber (11.43mm) version, but as described in chapter 6 this pistol did not satisfy the American military experts either. When given the opportunity to submit 200 .45 caliber (11.43mm) pistols for further American field trials, DWM and Luger passed up the opportunity, probably because only part of the projected cost of building a lot of 200 would be borne by the U.S. Ordnance Department. The Luger pistol proved to be more successful in Europe.

The Luger in Europe

Deutsche Waffen- und Munitionsfabriken (DWM) and Georg Luger tried at first without success to sell their pistol to the German military. The Gewehr-Prufungs-Kommission, the organization charged with testing small arms, had examined a number of self-loaders as they had become available, and the commission generally felt that these early pistols were either of too small a caliber or too fragile or too awkward for military use. In 1903, the Germans considered a number of pistols—a 9mm version of the Luger Parabellum, various Mannlichers, the 9mm Bergmann Mars pistol, the Schwarzlose 1893 Standart, Brownings, and a Mauser C96—that had been modified or improved to answer many of their original objections. While the Army and the testing commission experimented with small quantities of Lugers in 1900, 1902–1903, and 1905–1906, the German navy acted. On 12 December 1904, the Reichsmarineamt (German Naval Office) officially adopted the 9 × 19mm *Pistole, Marine-Modell 1904, System Borchardt Luger.* It was equipped with a 150-millimeter barrel, a combined extractor-loaded chamber indicator, and a unique two-position rear sight (graduated for 100 and 200 meters). As John Walters notes in *Luger,* there were at least five varieties of the Modell 1904, and from 1905 to 1918 DWM made more than 81,250 1904s for the navy.

The first Marine-Modell Lugers were a type transitional between the 1902 and the 1906 patterns. They had the flat-faced knurled toggle grips with the older anti-bounce lock mechanism. Fewer than 1,500 of these initial models were delivered to the Reichsmarineamt in 1905. The following year, DWM and Luger introduced an improved model—*neuer Art* (new pattern)—of their pistol with a coil spring instead of the flat mainspring and without the anti-bounce lock. Over 20,000 of this improved model were procured from 1907 to 1909. In 1908, DWM offered a slightly modified pistol, which was to become world famous as the *Pistole 08.* The Reichsmarineamt bought nearly 21,000 of this variant in which the safety

lever was pushed up to render the weapon safe. (Prior to 1908 the safety was pushed downward to engage it.) The version made between 1910 and 1914 (28,000) differed only in that it had a modified grip safety. The final variant, delivered between 1916 and 1918 (about 31,000) was built upon the shorter Pistole 08 frame with a 150-millimeter barrel.

Before the German army could decide on adopting the Luger Parabellum pistol, some significant changes were made in the design. W. L. Diebel in his studies of the Lugers used by the Dutch armed forces developed the convincing argument that the 1906 pattern Luger with its coil mainspring was the result of changes made by the Dutch military. The 1906-type Luger Parabellum was a popular pattern, produced from 1906 to 1937. John Walter estimates the production to have been slightly more than 80,000.

Certainly the Swiss army was the largest single user of the 1906 pattern. The Swiss bought pistols from DWM until 1914, when the German company stopped exporting so that it could concentrate on filling orders for the German government. During the war that followed, the neutral Swiss decided to produce the pistol domestically to prevent further disruptions of their supply. Tooling was prepared in 1917, and the first Lugers made at Waffenfabrik Bern were issued the next year. There were three distinct series of Swiss Modell 1906 pistols. The first was made by DWM (serial numbers 5,001–9,000), with the Swiss cross in a sunburst after the design, as used on the 1900 pistol. The second pattern was also made by DWM (serial numbers 9,001–15,215), with the Swiss cross inside a shield. The final pattern of the Swiss Ordonnanzpistole Modell 1906 was made at Bern (serial numbers 15,216–33,089); it bore a small Swiss cross and the name *Waffenfabrik Bern* on the toggle. The Swiss-made Lugers had wooden checkered grips with a plain border.

Pistole 08

The success of the Marine Modell 1904 and the 1906 *neuer Art* pistols led the German army to consider further the Luger Parabellum as a military pistol. On 22 August 1908, it adopted a slightly modified *neuer Art Pistole* in 9 × 19mm, officially designated the *Pistole Parabellum, Modell 1908,* but commonly known as the Pistole 08 or simply, the P 08. Like the 1906 model Luger, the P 08 had a coil mainspring and a combination extractor-loaded chamber indicator, but the grip safety and the old-style manual safety were replaced by a new safety device that impinged directly on the exposed trigger sear bar on the right side of the barrel extension. This new safety moved a vertical block, which prevented the sear from sliding laterally. Those P 08s manufactured before the fall of 1913 did not have the lug that permitted the attachment of a shoulder stock. Most of the P 08 pattern pistols built before 1914 did not have the bolt hold-open device. Just prior to the start of the 1914 to 1918 hostilities, a hold-open device, which supplemented the hold-open effect of the magazine follower, was reintroduced.

German army officials realized that DWM would not be able to produce all the pistols the army would require since nearly all officers and a majority of the noncommissioned officers would be issued the new side arm. To make up the difference, a second production line was established at the state-owned arsenal in Erfurt, the Erfurt Gewehrfabrik. The first Erfurt-made P 08s were delivered in 1911, and the government paid DWM and Georg Luger a royalty on each pistol produced at the rifle factory. By the beginning of the war in August 1914, DWM had manufactured more than a quarter of a million P 08s for the Germans, and John Walter estimates that between 1909 and 1918 about 1.6 million pistols of this

FIGURE 4–10. The 1906 pattern 7.65mm Luger Parabellum as adopted by the Swiss military; designated the Ordonnanzpistole 06. (*Waffenfabrik Bern*)

FIGURE 4–11. The 7.65mm Parabellum Swiss Ordonnanzpistole Modell 1906 of the second series manufactured by DWM. (*Waffenfabrik Bern*)

FIGURE 4–12. A typical 9mm Parabellum Pistole 08. (*U.S. Army*)

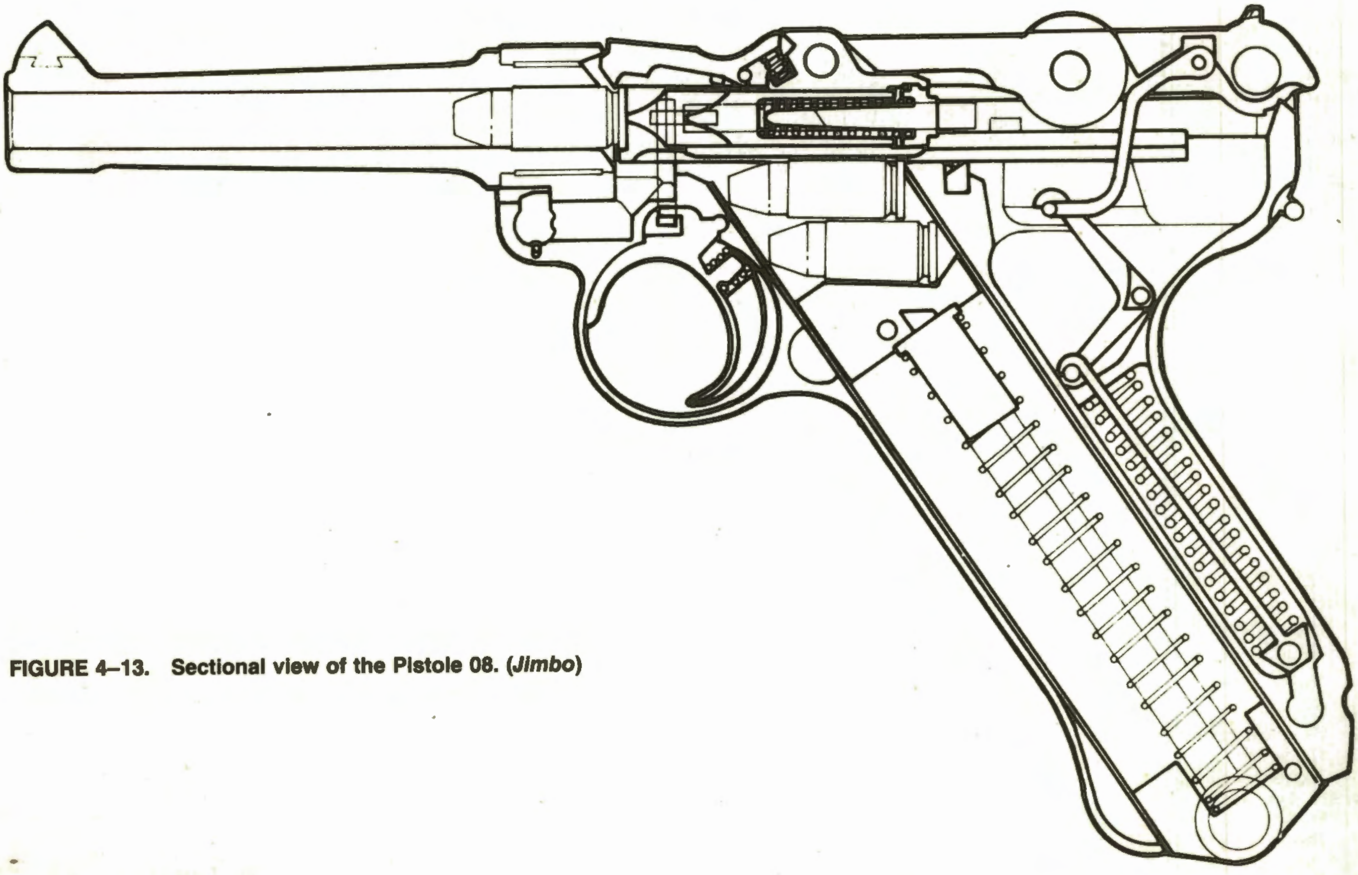


FIGURE 4–13. Sectional view of the Pistole 08. (*Jimbo*)

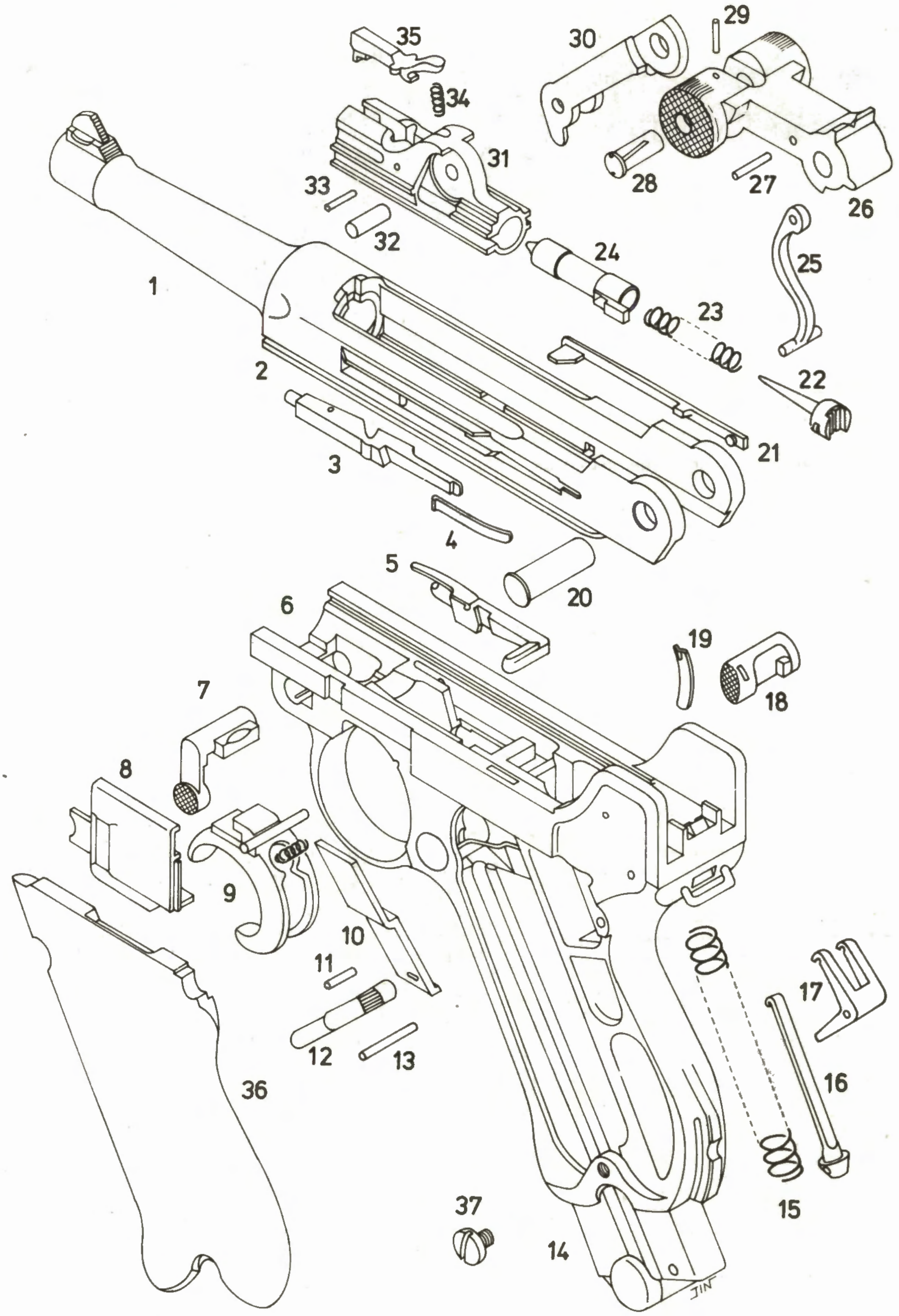


FIGURE 4–14. An exploded view of the 9mm Parabellum Pistole 08. (*Jimbo*)

1. Barrel
2. Barrel extension (receiver)
3. Trigger bar
4. Trigger bar spring
5. Hold-open latch
6. Frame
7. Take-down bolt
8. Trigger plate
9. Trigger
10. Safety bar
11. Safety pin
12. Safety lever
13. Recoil lever pin
14. Magazine
15. Mainspring
16. Mainspring guide
17. Recoil lever
18. Magazine catch
19. Magazine catch spring
20. Toggle pin
21. Ejector
22. Firing pin spring guide
23. Firing pin spring
24. Firing pin
25. Coupling link
26. Rear toggle link
27. Coupling link pin
28. Toggle pin
29. Toggle pin retaining pin
30. Forward toggle link
31. Breech block (bolt)
32. Breech block pin
33. Extractor pin
34. Extractor spring
35. Extractor
36. Grip plate
37. Grip plate screw

pattern were manufactured: DWM commercial production before 1914, 15,000; DWM military production, 1908–1918, 908,275; and Erfurt military production, 1910–1918, 663,-600+. It would appear that the Spandau Gewehrfabrik in Germany may have produced parts as a subcontractor to the works in Erfurt and may have even assembled as many as 100 to 150 pistols marked Spandau (of interest only to collectors).

Since the production tooling for the Pistole 08 was very complex and expensive, there were only three sets developed before 1918—at DWM, Erfurt, and the Waffenfabrik Bern. DWM's equipment was moved from the Berlin-Charlottenburg factory to the Berlin-Wittenau facility in 1916 and then to Mauser's Oberndorf factory in 1930. The Erfurt Gewehrfabrik production tooling was acquired by Simson & Companie of Suhl in 1919 and subsequently by Heinrich Krieghoff in 1935. The Waffenfabrik Bern machinery stayed at that arsenal until it was sold to Mauser in 1967. It was later set up in Oberndorf to satisfy the post-war collectors' market. All Luger Parabellums came from one of three sets of production equipment, and that equipment was moved around Europe for 60 years.* At the height of its production efficiency in 1915, DWM was making about 700 P 08 handguns per day. By comparison, Colt was producing 1325 Model 1911s and 375 Model 1917 revolvers daily; Smith & Wesson was turning out 725 Model 1917s; and Webley & Scott was making about 360 of their revolvers.

During World War I, 700 pistols per day was not enough for the Germans. Other types of pistols had to be pressed into service, as well. The Oberste-Heeres-Leitung and the Gewehr-Prüfungs-Kommission were forced to purchase and issue other handguns including the 7.65mm Browning Langenhan *FL-Selbstlader,* the 7.65mm and 9mm Parabellum Dreyse, the 7.65mm Browning Beholla, the C96 Mauser in 9mm Parabellum, and many of the Reichscommission revolvers. All were used during the long war against the Allies.

On 3 June 1913, the armies of Prussia, Saxony, and Würtemberg adopted another significant variant of the basic Pistole 08—the *lange Pistole 08,* which had a 200-millimeter barrel instead of the standard 100-millimeter barrel. As far back as the C93 Borchardt and the Mauser C96, there had been a desire to increase the range of the pistol for those situations in which a soldier might need a carbine-type weapon without it being a burden all the time. The shoulder

*John Walter concludes that the absence of any tooling other than that at DWM, Erfurt and Bern suggests that the Vickers-marked Parabellums made from 1922 to 1926 and purchased by the Dutch were probably built at DWM. This conjecture is strengthened by the fact that there were pre-war ties among Vickers, DWM, and the Loewes.

FIGURE 4–15. This Beholla 7.65mm Browning pistol built by Becker und Holländer of Suhl (serial number 27,463) is of the type used by the German army for non-front-line military personnel in World War I. This pistol had a 74-millimeter barrel and measured 140 millimeters overall. It weighed 626 grams and had a seven-shot magazine. (*Mezger*)

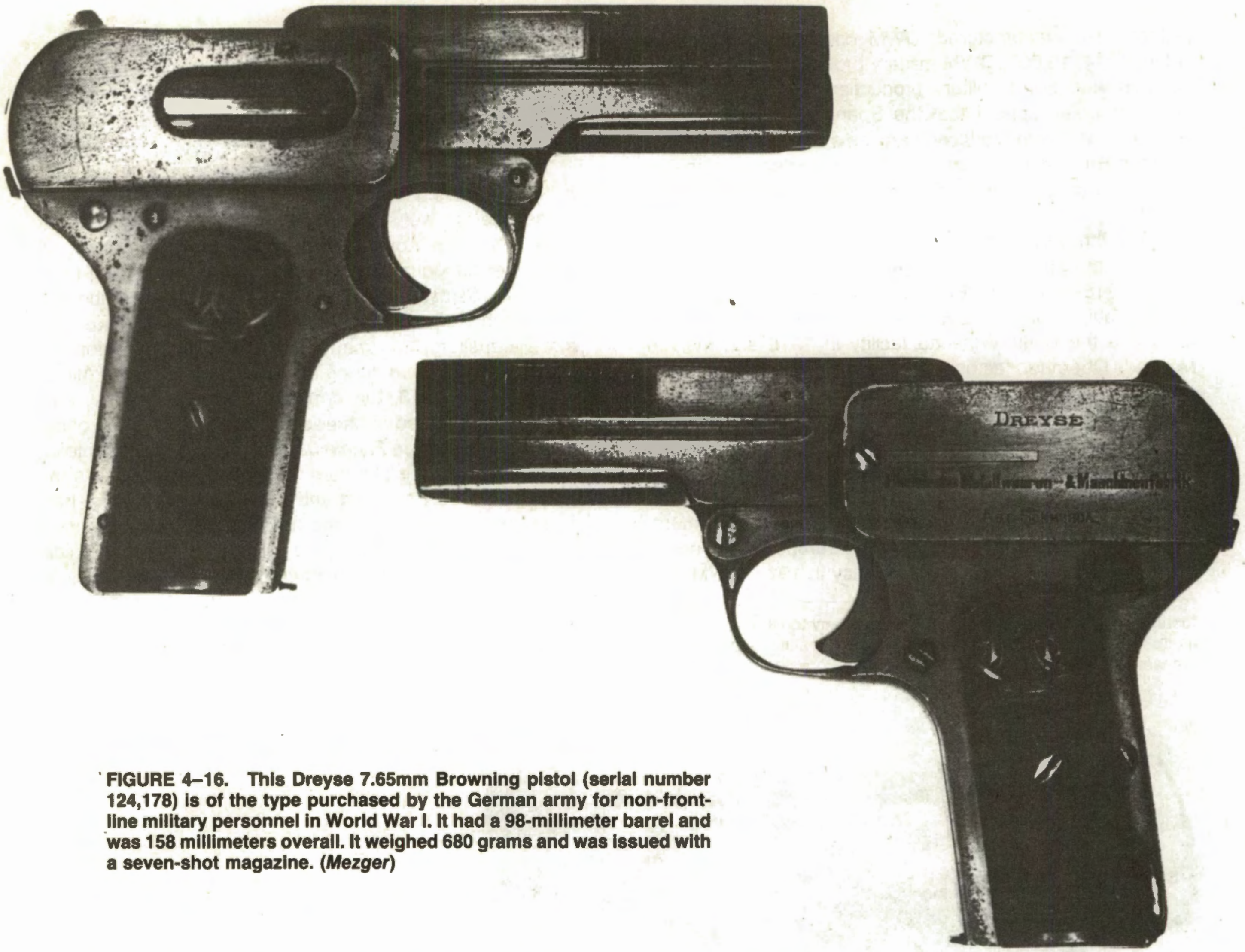


FIGURE 4–16. This Dreyse 7.65mm Browning pistol (serial number 124,178) is of the type purchased by the German army for non-front-line military personnel in World War I. It had a 98-millimeter barrel and was 158 millimeters overall. It weighed 680 grams and was issued with a seven-shot magazine. (*Mezger*)

stock pistol was one answer. A pistol with a 175-millimeter barrel had been demonstrated in the United States in 1903, and the Luger sporting carbines with their long barrels had been on the market since 1902 to 1905. Generally referred to as the Artillery Model, the long-barreled version of the Pistole 08 was the result of many years of experiments with pistol-carbines. It was fitted with a tangent leaf sight, and in 1917 a 32-shot drum magazine was introduced. This Trommelmagazin 08 was a nice addition to the stocked weapon, but it was hard to load and subject to jamming. Approximately 198,000 lange Pistole 08s were manufactured at DWM and Erfurt during World War I. Combining the totals for the standard and the long-barreled P 08s, 1.77 million Pistole 08s were made between 1908 and 1918.

Parabellum Production, 1918 to 1930

When Germany lost the war, the Allies imposed restrictions on the size of its post-war military establishment (4,000 officers, with 96,000 men of other ranks; in 1914 the standing army had been 870,000 strong with a reserve of 4.43 million) and on its arms industry. Together, the small size of the postwar German armed forces and the controls placed on firearms manufacturers considerably diminished weapons production and sales. In the years immediately following World War I, workers at Simson & Companie Waffenfabrik repaired and refinished P 08s built during the war. These handguns were then distributed as needed to the military and police units authorized to carry side arms and can be identified either by a double date (a pre-1918 date and 1920) or by the single date (1920), which replaced the original date of manufacture. This rebarreling and rebuilding activity accounts for some strange and unusual combinations of parts, which are often interpreted by new collectors as rare specimens. At first, Simson & Companie Waffenfabrik of Suhl had an exclusive contract for the rebuilding work because Allied occupation authorities forbade DWM from having direct relations with the new German army, but by 1925 Heinrich Krieghoff Waffenfabrik was also supplying new P 08s to the army, Parabellums that were being manufactured by DWM but marked Krieghoff.

During the post-war economic slump (1922), DWM was reorganized and renamed the Berlin-Karlsruher Industrie-Werk.* In addition to quietly supplying the Krieghoff with Par-

*On 29 June 1933, the firm's name was changed to Berlin-Karlsruher Industrie-Werke vormals DWM. The old Deutsche Waffen- und Munitionsfabriken name was readopted in 1936. In 1949, the name of the company was changed to Industriewerke Karlsruhe.

FIGURE 4–17. In addition to the smaller 7.65mm Browning caliber Dreyse pistol, the 9mm Parabellum Dreyse was one of the substitute handguns used during the 1914–1918 war by German officers. Introduced just before the beginning of that war, this pistol was manufactured by the Rheinische Metallwaaren- und Machinenfabrik in Sommerda. It was unique because of the solution to the blowback-type operating principle included in the design. The very heavy recoil spring made this pistol difficult to cock; therefore, the designers created a lift-up cocking handle that permitted it to be loaded and armed without having to compress the recoil spring. This pistol had a 126-millimeter barrel, was 206 millimeters overall, weighed 1,050 grams, and was issued with an eight-shot magazine. (*Krcma*)

FIGURE 4–18. The "FL-Selbstlader" was a 7.65mm Browning caliber self-loading pistol manufactured by Fritz Langenhan of Suhl. This pistol was a blowback type with an enclosed hammer, and it had an unusual means of coupling the breech block and the slide. A stirrup-shaped piece at the rear of the slide was locked by using a large screw. When the screw was loosened and the stirrup released, the slide could be removed by sliding it forward away from the fixed barrel. The breech block was pulled off the weapon by sliding it to the rear. This pistol had a 105-millimeter barrel, was 168 millimeters overall, weighed 649 grams, and had an eight-shot magazine. (*Krcma*)

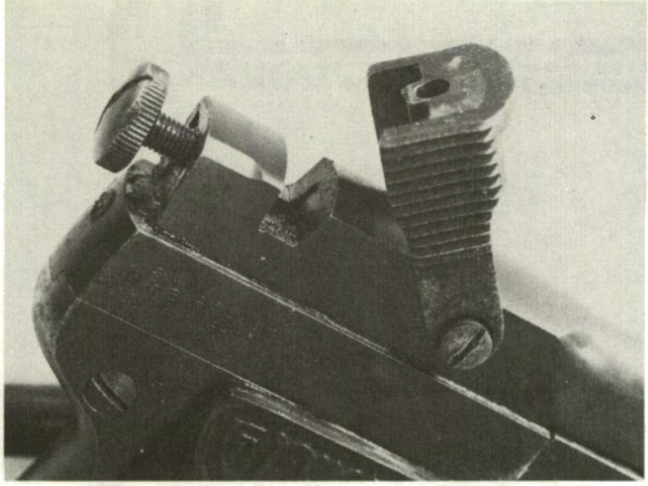


FIGURE 4–19. The breech block stirrup of the "FL-Selbstlader" shown in the disassembly position. (*Hogg and Weeks*)

abellums, DWM/BKIW also sold thousands of these pistols abroad, with A. F. Stoeger of New York City being one of their largest distributors. In the United States, the Parabellum became known by its registered trademark, *Luger.* Prior to 1930, the only significant military orders for the Parabellum came from Finland (see chapter 16) and the Netherlands. About 5,000 went to Finland, 3,820 were delivered to the Army Air Force in the Dutch Indies, and 1,484 were acquired by the Dutch navy.

In his book, John Walter has tried to unravel the production story of DWM/BKIW for the years after the war and before the disposal of the production tooling to Mauser in 1930. By comparing his figures (table 4–5) with the level of wartime production, the decline in DWM's production can be fully appreciated. In the decade from 1920 to 1930, this German firm built about 35,000 Parabellums, a yearly average of 3,500, but during World War I they turned out 170,000 each year. In other words, DWM could have produced 3,500 pistols in only five days; after the war they had to stretch out one week's work to fill up an entire year.

Clearly, DWM could not operate like this for long and stay in business. Accordingly, the industrial combine that controlled DWM/BKIW and also the Mauser-Werke transferred the Parabellum production machinery to Mauser in Oberndorf. It made economic sense to concentrate the much-reduced production of pistols, rifles, and machine guns in a single area. The workers who made up the small post-war work force could be moved from one project to another without any significant loss of time or productivity. By 1 May 1930, the transfer of over 800 machines and the technicians and engineers responsible for supervising Parabellum production

FIGURE 4–20. The "FL-Selbstlader" disassembled. (*Hogg and Weeks*)

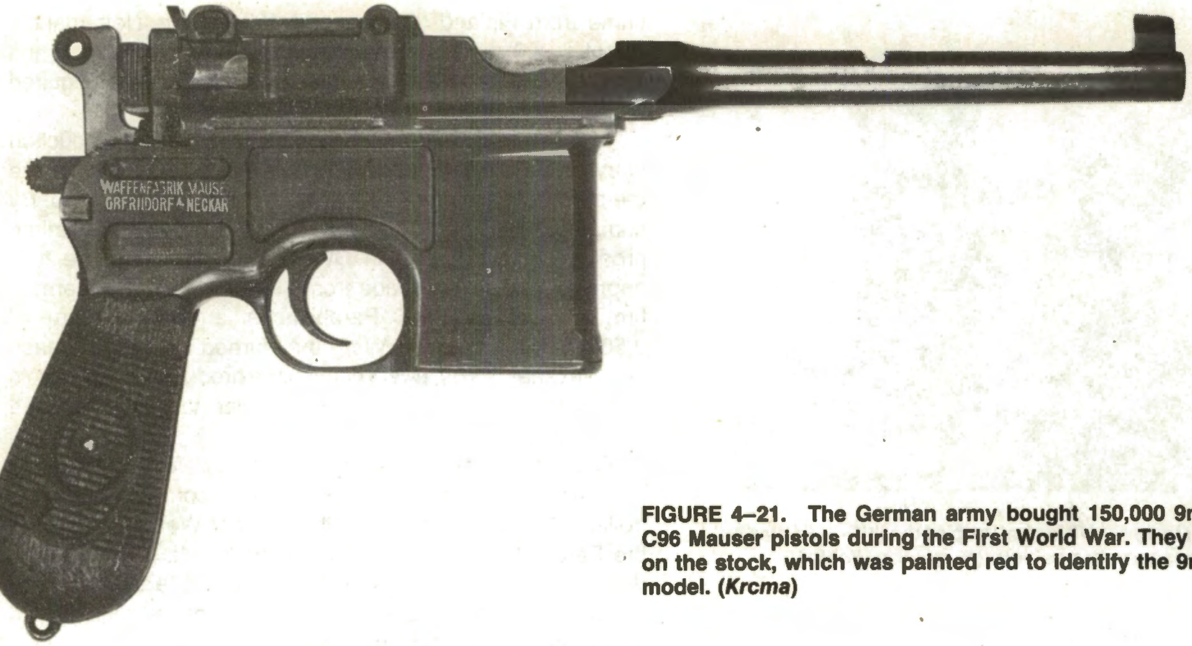


FIGURE 4–21. The German army bought 150,000 9mm Parabellum C96 Mauser pistols during the First World War. They had a carved 9 on the stock, which was painted red to identify the 9mm Parabellum model. (*Krcma*)

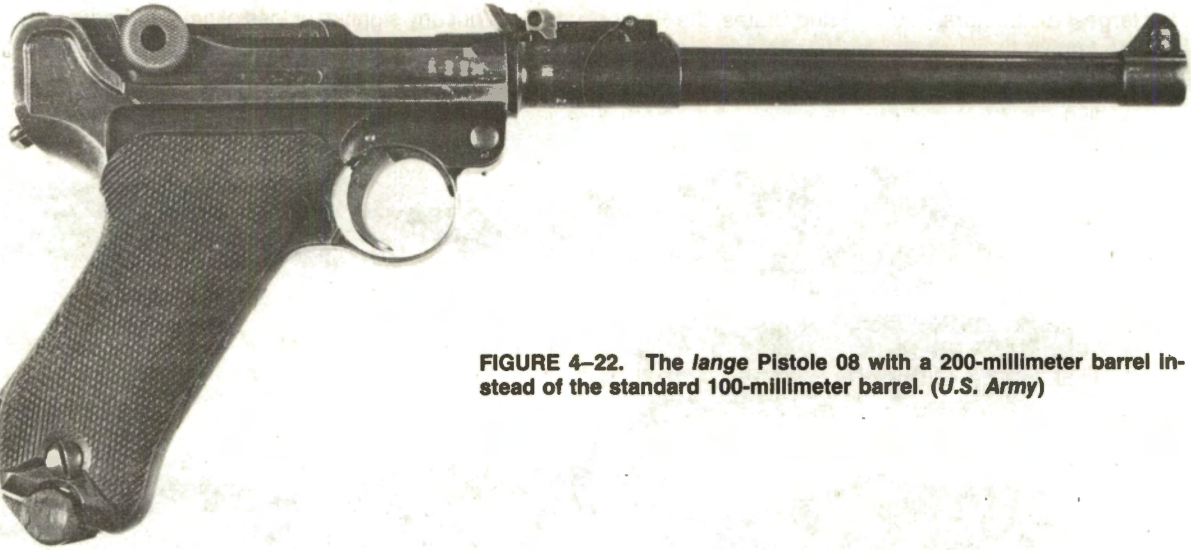


FIGURE 4–22. The *lange* Pistole 08 with a 200-millimeter barrel instead of the standard 100-millimeter barrel. (*U.S. Army*)

TABLE 4-5 ESTIMATED PRODUCTION FOR THE PARABELLUM PISTOL, 1920–1930

Model	*When Produced*	*Total Estimated*
New pistols assembled from parts, DWM		**15,000**
Commercial, DWM/BKIW	**1923–30**	**22,500**
Commercial, DWM/BKIW for Krieghoff	**1925–30**	**1,000**
New pistols assembled from parts, Simson		**1,000**
Finnish military, DWM/BKIW	**1923–29**	**5,000**
Dutch Indies Army Air Force, DWM/BKIW	**1928–30**	**3,820**
Royal Netherlands Navy, DWM/BKIW	**1928–30**	**1,484**
Approximate total		**49,804**

Source: John Walter, *Luger, passim.*

had been moved to Oberndorf. For the next five years Mauser applied the famous DWM monogram to the Parabellums produced at their factory.

The shift of the DWM production tooling to Mauser coincided nicely with the beginning of secret rearmament activities in Germany. As numerous students of the Parabellum have noted, the government's desire to obscure the quantities of pistols being produced and hide their origin led to a curious selection of pistol markings. In 1934, the Wehrmachtswaffenamt (the German Ordnance Office, later called the Heerswaffenamt) assigned the production code *S/42* to the Mauser factory, which replaced the Mauser banner trademark. The year of production was indicated by a *K* for 1934 and a *G* for 1935. In 1936, the factory began to use the date again, and the *S/42* was replaced by *42*. In 1941, the Mauser factory code was changed again to *byf,* which it used until the end of the Second World War. German military Parabellum manufacture, however, was terminated in 1942.

Mauser Parabellum Export Contracts, 1930 to 1940

During the 1930s, Mauser filled five major military contracts for the Parabellum. Most of these pistols were marked with Mauser's commercial trademark and constituted only a small part of Mauser's production when compared with the number being manufactured for German military and police organizations. Between 1930 and 1940, Mauser continued the delivery of Parabellums to the Dutch Indies Army Air Force (1906 pattern with 100-millimeter barrel) and to the Royal Netherlands Navy (1908 pattern with 100-millimeter barrel) begun by DWM/BKIW. Of the 7,093 pistols built for the Dutch military, 5,304 were made at the DWM/BKIW factory; 664 were assembled by Mauser and marked DWM; 1,125 were produced by Mauser and marked with the Mauser trademark (3,839 of this lot went to the army and 3,254 were to go to the navy; 600 of the latter were not delivered before the invasion of the Netherlands and were sent to German troops instead). An unspecified number of Parabellums (probably about 3,000) were delivered to Turkish police and military officials between 1935 and 1937. About 4,600 P 08-type pistols were delivered to Portugal in 1943; Latvia acquired 853 between 1936 and 1939; Persia bought 3,000 P 08s and 1,000 *lange* P 08s during the years from 1934 to 1939; and Sweden procured 319 P 08s (34 chambered for 7.65mm) for their tests of self-loading pistols in 1938 and 1939.

Mauser Parabellum Production for German Military and Police Organizations, 1934 to 1942

Between 1934 and 1942, German military purchases of the P 08 totaled about 930,600 units from the Mauser-Werke, while Krieghoff made only about 9,200, and Simson & Companie built at the most a few hundred. Based on the research done by John Walter, Fred Datig, and others, World War II-era production of the Parabellum P 08 can be summarized as shown in table 4–6. Police and paramilitary purchases probably account for another 30,000 pistols. When the 332,000 Parabellums built before World War I are added to the 1,521,000 produced during the war and the 965,000 Parabellums of World War II-vintage, the total number of military Parabellums built for the German armed forces comes to nearly 2,818,000.*

During the late 1930s, while Parabellum production continued at the Mauser-Werke, the German army began to search for a newer, cheaper self-loader that was also easier to manufacture than the Luger design. Each Parabellum required about 12.5 hours to make, and from start to finish more than 778 separate operations were performed on its parts (642 by machine, 136 by hand). In 1939, the P 08 cost 11.50 reichsmarks to manufacture, and the magazines were 3.15 reichsmarks each. With two magazines, the handgun cost Mauser 17.80 reichsmarks to make in 1939, and they sold it to the government at 40 reichsmarks ($16.00). Walther's Pistole 38, which was selected to replace the Parabellum, cost only 5.60 reichsmarks to build. Because of the substantial difference in cost, the P 38 seemed like a much better bargain for a country readying to storm the rest of Europe. But by 1943 when Mauser terminated production of the P 08 and began to turn out the P 38, the cost had risen to 32 reichsmarks ($12.80). While the difference in terms of cost between the two self-loaders had almost vanished, the

TABLE 4-6 PRODUCTION OF THE P 08, 1934–1942

Year	*Total Produced*
1934	**ca. 10,000**
1935	**ca. 80,000**
1936	**ca. 80,000**
1937	**ca. 120,000**
1938	**ca. 143,000**
1939	**ca. 118,000**
1940	**129,420**
1941	**151,420**
1942	**102,760**

*All production figures for the Parabellums are approximations.

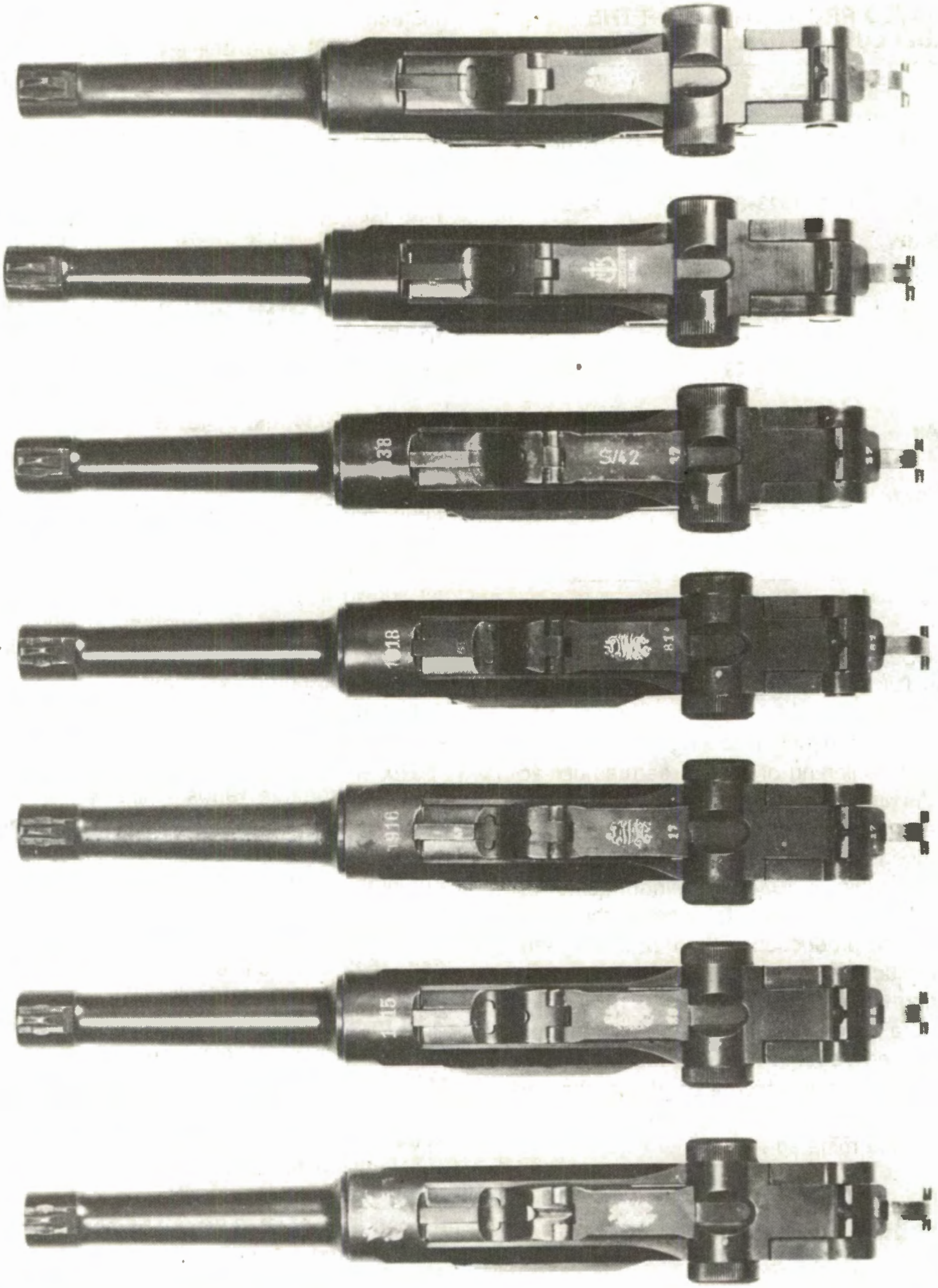


FIGURE 4–23. 9mm Parabellum Pistole 08 markings, *top to bottom:* DWM, no date; Heinrich Krieghoff, no date; Mauser *S/42*, dated 1938; DWM, dated 1918; DWM, dated 1916; DWM, dated 1915; and DWM, with the American Eagle markings. (*Krcma*)

P 38 (described in chapter 9) was still much less complicated to manufacture, which meant that Mauser was probably made greater profit on the P 38 but kept its price slightly lower than the P 08s.

Swiss Parabellum Production; 1925 to 1947

The Eidgenössische Waffenfabrik Bern continued to manufacture the7.65 mm Parabellum caliber Ordonnanzpistole 06 until 1928. Although its price had dropped from 400 francs ($77) in 1918 to 225 francs ($43) in the late 1920s, it was still considered costly, especially when the price of the Ordonnanzrevolver 82 was only 120 francs ($23.15). Looking at these figures, the practical, frugal Swiss decided to develop a version of the Parabellum that would be less expensive to produce. On 17 April 1928, the Kriegtechnichen Abteilung (KTA, Military Technology Department) of the Kriegsmilitarverwaltung (KMV, War Department) called a meeting to discuss ways to reduce the cost of making a self-loader. The

*John Walter's excellent book *Luger* contains much more detailed analyses of Luger production.

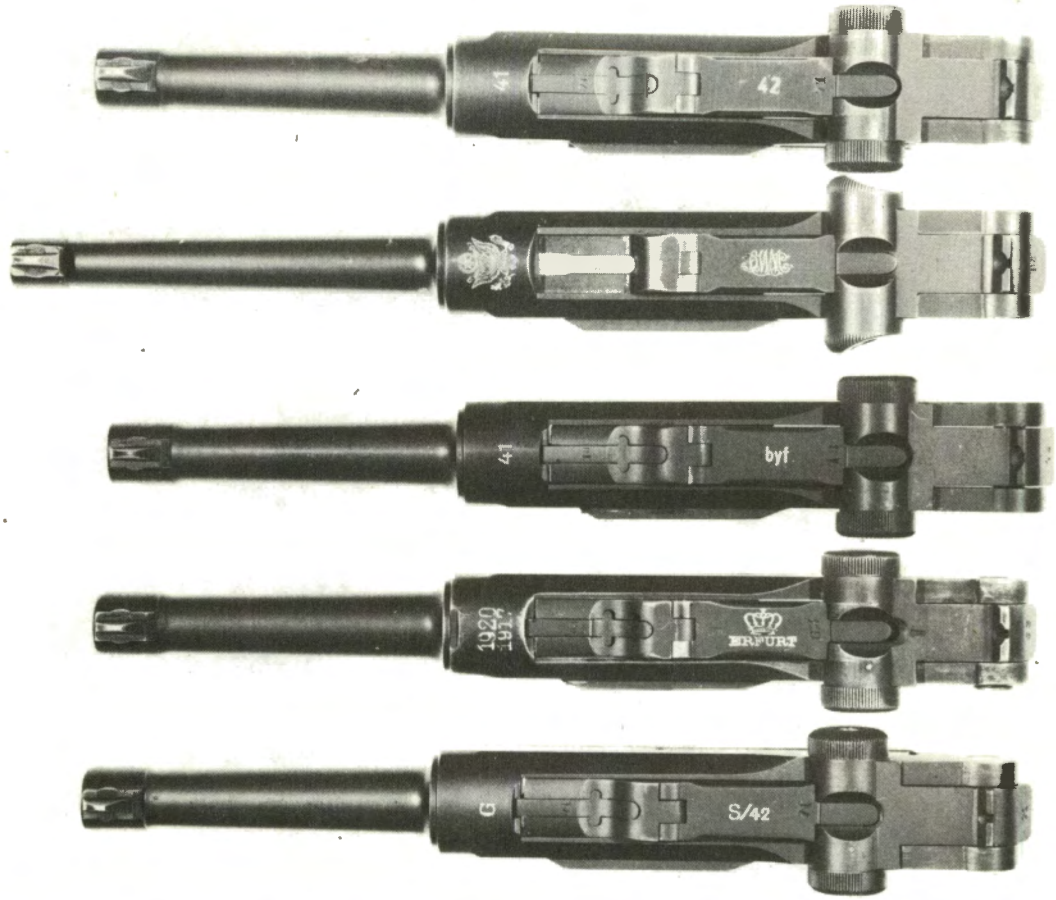


FIGURE 4–24. More Parabellum Pistole 08 markings, *top to bottom:* Mauser *42*, code-dated 1941; DWM, with the American Eagle markings (1900-type in 7.65mm Parabellum); Mauser *byf*, code-dated 1941; double-date Erfurt, 1917 and 1920; and Mauser *S42*, code-dated *G* (1935). (*Krcma*)

FIGURE 4–25. Versuchsmodell Ordonnanzpistole 1906/29 (serial number V21). Note the change in the front strap of the grip, the altered safety lever, and the absence of knurling on the toggle grips. This was one of the type tested in the 1929 trials. (*Waffenfabrik Bern*)

FIGURE 4–26. The Le Francais 9mm Browning Long Military Model of 1928 as tested by the Swiss in 1929 was probably similar to this one, except that it would not have had the engraving. Manufactured by the Manufacture Francaise de Armes et Cycles de Sait-Étienne in Sait-Étienne, France, this self-loader was principally noted for its hinged barrel, which could be released by using a lever so that the barrel could be loaded or cleaned. The barrel also flew open when the magazine was removed, thus making it impossible to fire while being reloaded. The Military Model often had a loop on the base of the magazine, which held one extra round that could be loaded into the barrel before it was closed. This pistol was 203 millimeters overall, with a 127-millimeter barrel. It weighed 954 grams and was issued with an eight-shot magazine. (*Krcma*)

result was the modification of a few machining processes, the substitution of plastic grips for wooden ones, and the issue of two instead of three magazines with each pistol, yielding only a 10-franc savings (less than $2.00). About 5,590 of the modified Ordonnanzpistole 06/24 were made between mid-1928 and May 1933.

During the five years (1928–1933) that the pistol revision committee met, additional changes were suggested to reduce the machining necessary to build the Swiss Parabellum. Knurling on the toggle grips could be eliminated, the takedown catch simplified, the front strap made straighter, the receiver altered, and less expensive plastic grips used. By August 1928, the managers at the Waffenfabrik had the unit cost down to 170 francs ($32.81) on a production run of 5,000, or 160 francs ($30.88) on an order for 10,000. The Ordonnanzpistole 06/24 was costing about 205 francs ($39.57) at this time. Swiss treasury officials examined the possible alternatives and recommended that the government direct the Waffenfabrik Bern to manufacture its own Parabellum pistol at a slightly higher unit price rather than buy the German Parabellum from DWM/BKIW at 132 francs ($25.48). This ensured Switzerland a steady supply of self-loaders in the event of another European war and allowed the Swiss to maintain a domestic manufacturing capability.

On 19 January 1929, the factory in Bern was given permission to produce 21 units of the reduced-cost Parabellum, numbered V1 to V21 (*V* for versuchs, or test). The Versuchsmodell Ordonnanzpistole, delivered in June 1929, was submitted to a series of trials in which it was rated with three other self-loaders: the 9mm Largo Star Modelo A, priced at 76.50 francs ($14.76); the 7.65mm Browning Czechoslovakian vz. 27 at 71.50 francs ($13.80); and the 9mm Browning Long caliber Le Francais at 61.50 francs ($11.87). The Parabellum and the Star were the two favorite designs, since they had locked breeches and fired the most powerful ammunition. Of these two, the Parabellum was the more accurate. Despite its greater cost, Swiss military officials elected to stay with the Swiss-made Parabellum.

On 30 November 1929, the Swiss offically adopted the *Ordonnanzpistole 06/29 W+F* for officers and senior noncommissioned officers. The first of the new handguns was delivered on 29 August 1933, at which time production of the 06/24 pattern was terminated. (As noted in chapter 2, a modified version of the Ordonnanzrevolver 82 had been adopted for the rank and file in January 1930, designated the 82/29.) A total of 27,931 06/29 pistols were made from 1933 to 1947, and just under 2,000 additional Parabellums were manufactured for private sale (serial numbers for the latter had a *P* prefix).

By 1940, the Swiss were looking for a potential replacement for their Parabellum. In September, the War Department's military technology staff acquired a Spanish Astra 900 (see chapter 14) and a Schweizerische Industrie-Gessellschaft (SIG) *Petter-type* pistol for tests with the 06/29 as converted to fire 9mm Parabellum. The Astra was quickly rejected because it offered few advantages over the C96 Mauser, and the SIG Petter was found to be inferior to the 06/29 pistol and the 82/29 revolver in accuracy. In 1941, the Swiss once again examined several designs: the SIG Petter, the Walther PP and P 38, the French Modèle 35 A (?), a Colt (.38 Super?), and the Polish wz. 35. Waffenfabrik Bern also introduced a Browning-type self-loader patterned after the FN Model 1935 GP, which the Swiss called the Pistole W+F Browning. Firing trials demonstrated once again the inherent accuracy of the Parabellum, but the Browning pattern self-loader was considerably more reliable. After many shooting demonstrations, the military authorities decided to continue the trials with the SIG Petter and the Browning. These experiments went on until the 1949 adoption of an improved SIG Petter, called the *Ordonnanzpistole 49 SIG* and marketed commercially as the P-210.

When Swiss production of the 06/29 pistol ended in 1947, military utilization of the Parabellum was also coming to an end, but its popularity as a collector's item was just beginning. By the late 1960s, the collector demand for Parabellums was sufficient to justify the production of the pistol once again, but this time the popular weapon was made at Mauser on Swiss tooling.

The figures in table 4–7 indicate the scope of the Borchardt and Luger Parabellum production in the pre-1945 period. Ludwig Loewe & Companie produced about 800 of the C93 Borchardts and less than 6 pre-production models. DWM turned out approximately 2,200 C93s and less than 12 improved Borchardts (C97s and C98s). Production of the various Luger Parabellums is summarized by manufacturer. During the period of this study, the Parabellum was equaled in popularity and in the number manufactured only by the U.S. Model 1911. The military model Parabellums built for the German government from 1904 to 1942 totaled about 2.82 million, roughly equal to the number of military Colt M1911s and 1911A1s in use at that time (about 2.67 million). In numbers produced, the Pistole 38 was number three with 1.24 million, and the Mauser C96 and Tokarev TT30 and TT30-33 tied for fourth at about 1 million each. Based upon available information, however, it can be said that more Parabellum pistols, including military and commercial models, were produced than any other type of military self-loader—nearly 3,118,000.

TABLE 4-7 PARABELLUM MANUFACTURE BY FACTORY

Factory	*When Produced*	*Total*
Deutsche Waffen-und Munitionsfabriken, Berlin	**1898–1930**	**1,331,882**
Mauser-Werke AG, Oberndorf am Neckar	**1930–42**	**1,014,276**
Königliche Gewehrfabrik, Erfurt	**1911–18**	**686,100**
Eidgenössische Waffenfabrik, Bern	**1919–47**	**47,948**
Simson & Companie, Suhl	**1925–35**	**17,000**
Heinrich Krieghoff Waffenfabrik, Suhl	**1935–45**	**14,700**
Vickers-Armstrong Ltd, Crayford, England (DWM-Made?)	**1922–26**	**ca. 6,250**
Königliche Gewehrfabrik, Spandau (assembled only?)	**1918**	**ca. 150**

HANDGUNS TESTED BY THE SWISS MILITARY DURING THEIR

FIGURE 4–27. Two Ordonnanzpistole 06/29 converted between 1933 and 1934 to 9mm Parabellum (serial numbers 68,254 and P26,291). Both were used in government tests, even though the one bears a commercial serial number. (*Waffenfabrik Bern*)

FIGURE 4–28. The 9mm Parabellum SIG Selbstladepistole 44/8, an adaptation of the SIG Petter pistol (serial number 6,005). (*Visser*)

FIGURE 4–29. SIG's 9mm Parabellum Selbstladepistole Neuhausen 44/16 (serial number 6,023), with a 16-shot magazine. It dates from about 1945. (*SIG*)

SEARCH FOR A REPLACEMENT FOR THE PARABELLUM.

FIGURE 4–30. The SIG Ordonnanzpistole 49 made for the Swiss army (serial number A174,121). (*Tokol*)

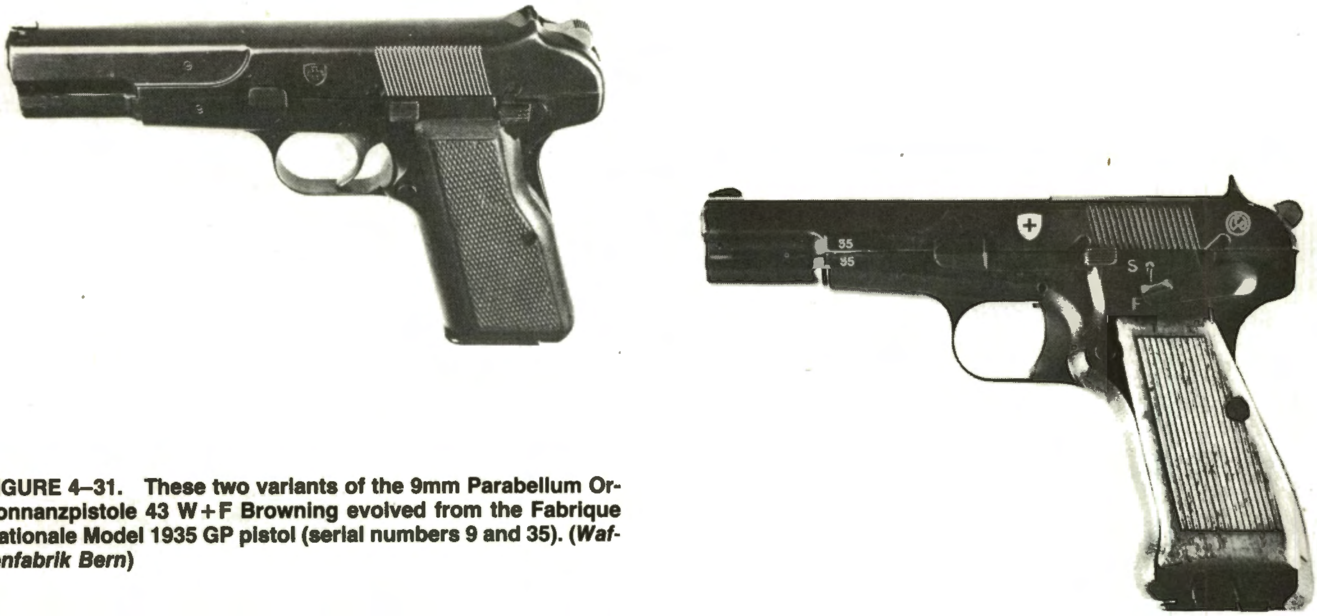


FIGURE 4–31. These two variants of the 9mm Parabellum Ordonnanzpistole 43 W+F Browning evolved from the Fabrique Nationale Model 1935 GP pistol (serial numbers 9 and 35). (*Waffenfabrik Bern*)

FIGURE 4–32. The Pistole 47 W+F (serial number 44) embodied a gas piston system to delay the unlocking of the pistol. A similar gas system was used on the Heckler & Koch 9mm PSP in the late 1970s. (*Krcma*)

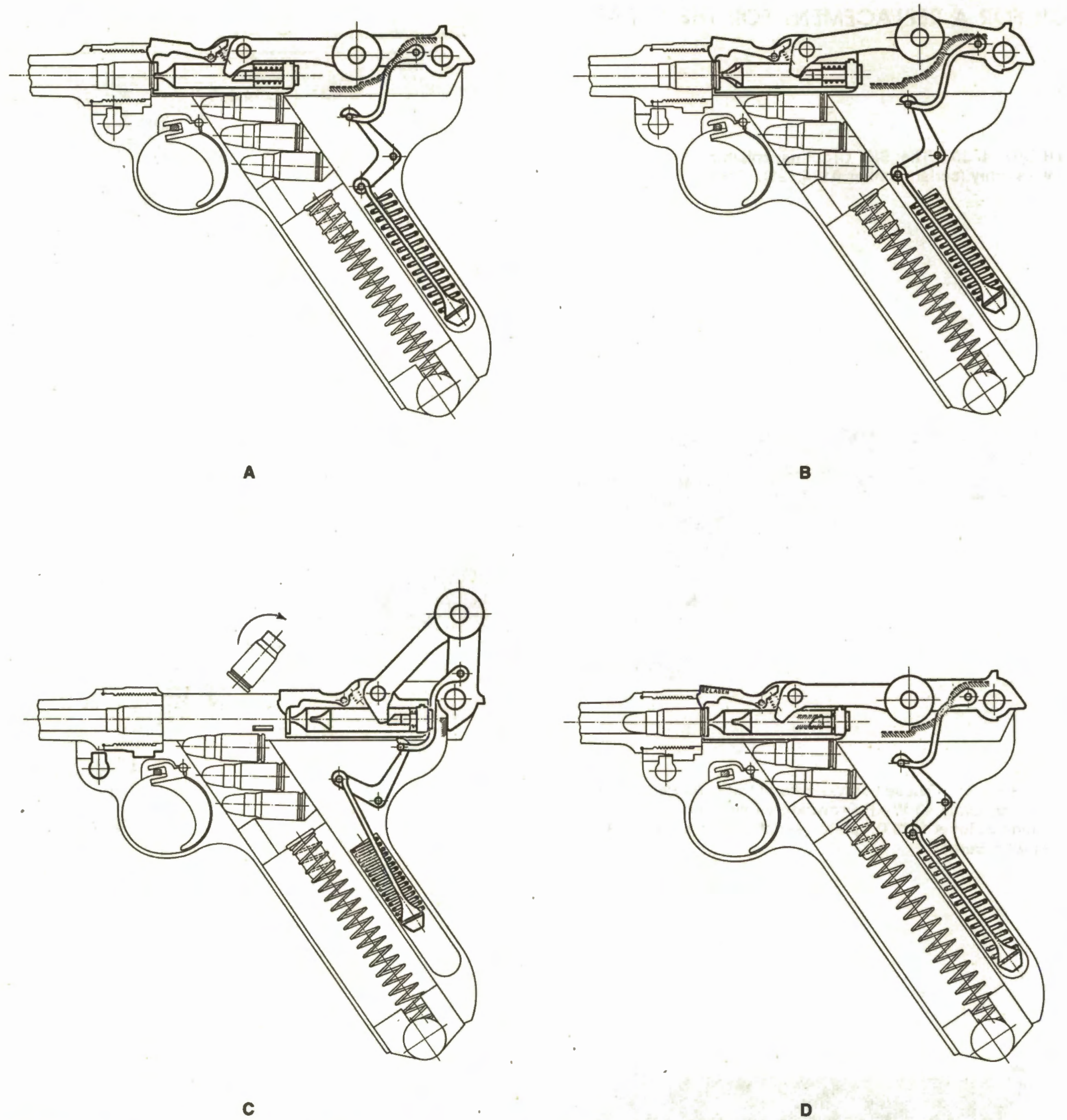
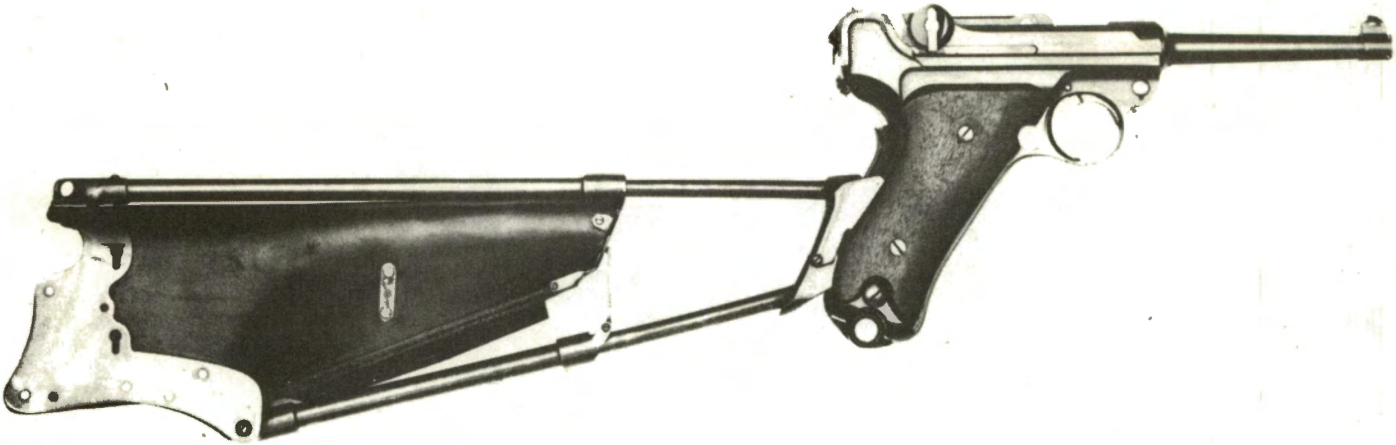


FIGURE 4–33. The Luger-Parabellum operating sequence, as illustrated by the Swiss Ordonnanzpistole 06/29. (*Waffenfabrik Bern*)

A The pistol at the moment of firing and prior to the start of recoil.
B At the moment the toggle system has been unlocked by the camming surfaces on the frame.
C The breech bolt all the way to the rear; the ejected cartridge is leaving the gun.
D Reloaded, cocked, and ready to fire.



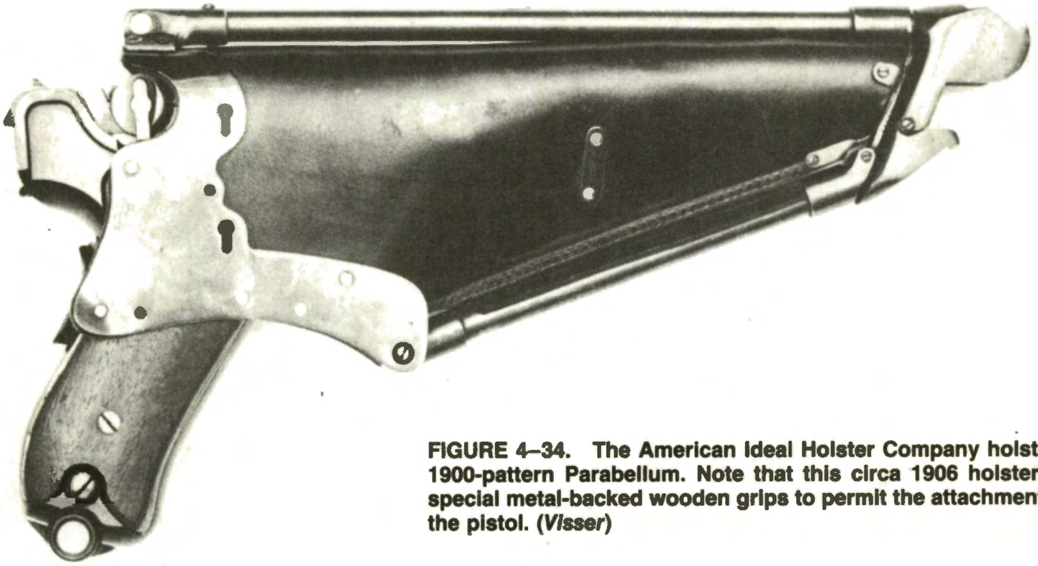


FIGURE 4–34. The American Ideal Holster Company holster-stock for the 1900-pattern Parabellum. Note that this circa 1906 holster-stock required special metal-backed wooden grips to permit the attachment of the stock to the pistol. (*Visser*)

FIGURE 4–35. An experimental version of the Swiss 7.65mm Ordonnanzpistole 06, circa 1908–1909, with a 16-shot magazine. (*Waffenfabrik Bern*)

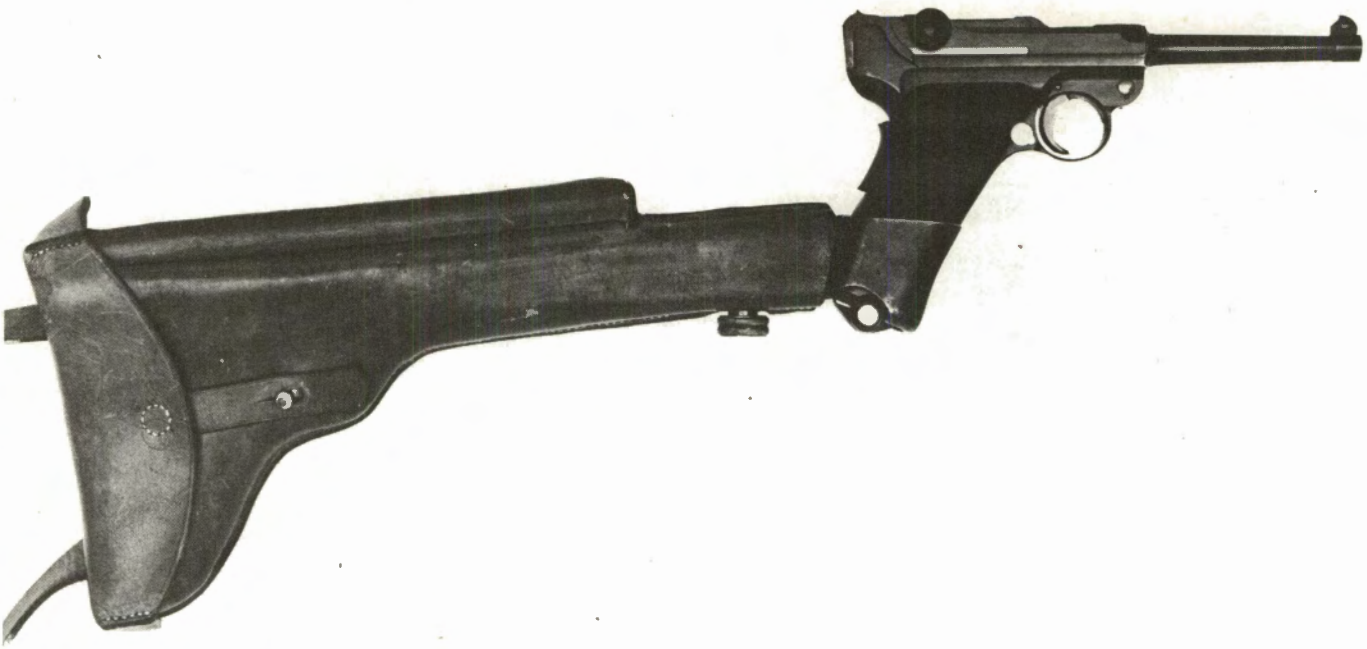


FIGURE 4–36. A Swiss 7.65mm Ordonnanzpistole with experimental leather holster-stock. This pistol was fitted into a metal loop on the stock. (*Visser*)

Notes

Unless otherwise noted this chapter was drawn from:
Datig, Fred A. *The Luger Pistol (Pistole Parabellum): Its History and Development from 1893–1945.* Los Angeles: Borden Publishing Co., 1962.

Jones, Harry E. *Luger Variations.* Los Angeles: Harry E. Jones, 1975.

Kenyon, Charles Jr. *Lugers at Random.* Chicago: Handgun Press, 1969.

Walter, John. *Luger, An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present.* London: Arms & Armour Press, 1977.

1. E. C. Matschoss, ed., *50 Jahre Deutsche Waffen- und Munitionsfabriken, Aktiengesellschaft* (Berlin: VDI Verlag, 1939), pp. 53–54.

2. Letter, Deutsche Waffen-und Munitionsfabriken (DWM) to U.S. War Dept., 15 Dec. 1896, correspondence file O.O. 18,884, entry 28, Record Group (RG) 156, National Archives. *See also* for background on Ludwig Loewe, John Walter, *Luger, An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present* (London: Arms & Armour Press, 1977), p. 247–49; Ludwig Olson, *Mauser Bolt Rifles, 3d ed. (Montezuma, IA: F. Brownell & Son, Publishers, Inc., 1976), p. 19; Jaroslav Lugs, Firearms Past and Present: A Complete Review of Firearms Systems and Their Histories,* vol. I (London: Grenville Publishing Co., Ltd., 1975), pp. 488–91, 537–38; and Ludwig Loewe and Co., AG, *Ludw. Loewe & Co. A.G., Berlin, 1868–1929, Hrsg. zum sechzigjährigen Jubiläum der Firma von der Gesellschaft für Electrische Unternehmungen* (Berlin: VDI Verlag, 1930).

3. Henry Hess, "Random Notes from Germany on Things Mechanical and Otherwise, Part 2," *American Machinist* (6 April 1899): 24.

4. Walter, *Luger,* p. 247; Harold F. Williamson, *Winchester: The Gun That Won the West* (South Brunswick and New York: A. S. Barnes and Co., 1952), pp. 69–70; and Richard Rattenbury, "Winchester Revolvers," *Buffalo Bill Historical Center* 3 (Jan.–March 1979): 1–2.

5. Frank M. Sellers, *Sharps Firearms* (North Hollywood: Beinfeld Publications, 1978), pp. 202, 255, 258–60, 263, 294–95.

6. Walter, *Luger,* p. 247.

7. Hess, "Random Notes," p. 25.

8. Military Information Div., Adjutant General's Off., War Dept., *Notes and Statistics of Organization, Armament, and Military Progress* (Washington: GPO, 1894), p. 79. References to Robert K. Evans' contacts with the Loewe firm are found in "Memoranda on Attache's Despatches, 1889– " contained in "Despatch Books and Cross Reference Sheets," box 10, Entry Records of the War Dept. General Staff, Adjutant General's Off. Records, RG 165, National Archives. Representative dispatches are those dated 12 June 1893, 5 March 1894, 19 Dec. 1894, 6 Oct. 1895, and 15 Jan. 1896.

9. "The Borchardt Automatic Pistol," *New York Times,* 21 Oct. 1894, p. 21; and "A Curious Automatic Pistol," *New York Times,* 14 Oct. 1894, p. 7.

10. Military Information Div., *Notes and Statistics,* p. 79.

11. Fred A. Datig, *The Luger Pistol (Pistole Parabellum): Its History and Development from 1893–1945* (Los Angeles: Borden Publishing Co., 1962), pp. 50–51.

12. "The Borchardt Repeating Pistol," *American Machinist* 18 (14 Feb. 1895): 121–22; and "Improved Repeating Pistol," *Scientific American* 73 (7 Aug. 1895): 69.

13. Letter, Hans Tauscher to D. W. Flagler,16 Oct. 1897, O.O. 23,377, RG 156; and "Proceedings of a Board of Officers," 23 Dec. 1897, O.O. 23,377/1, RG 156.

14. Letter, Hermann Boker & Co., to Flagler, 28 March 1898, O.O. 23,377/4, RG 156; and Boker to Flagler, 14 April 1898, O.O. 23,377/4, RG 156.

15. Walter, *Luger,* pp. 45–52; and Fritz Haüsler, *Schweizer Faustfeuerwaffen: Die*

Schweizer Pistolen und Revolver von 1817 bis heute in Wort und Bild (Fraunfeld: Verlag Fritz Haüsler, 1975), pp. 52–54.

16. Military Information Div., *Notes of Military Interest for 1902,* E. A. Edwards et al., comp. (Washington: GPO, 1903), p. 113.

17. Datig, *Luger Pistol,* p. 67. The entire report is reprinted in Datig.

18. Letter, C. B. Sweezey to William Crozier, 14 April 1902, O.O. 23,377/8, RG 156.

19. J. Pittman, J. T. Thompson, and W. S. Pierce, "Report on Different Calibers and Lengths of Barrels of Luger Automatic Pistol," 25 July 1902, O.O. 233,377/204, encl. 2, RG 156.

20. Ward B. Pershing, "Extract Copy of the Proceedings of the Cavalry Board, Which Met July 3, 1904," 7 July 1904, O.O. 23,377/244, encl. 1, RG 156; and S. W. Taylor, "Report on Tests Made by the Field Artillery Board of the Luger Automatic Pistol, cal. 9mm," 23 Sept. 1904, O.O. 23,377/247, encl. 1, RG 156.

21. Letter, P. Francis Crosby to Chief Ordnance Officer, Philippine Div., 12 April 1905, O.O. 23,377/258, RG 156.

5 FN BROWNING SELF-LOADING PISTOLS, 1894 TO 1945

John M. Browning and Fabrique Nationale d'Armes de Guerre (FN) are two stories intertwined—the tale of an inventor and the manufactory that built his handguns.*

JOHN MOSES BROWNING

John M. Browning's father, Jonathan, was a gunsmith by trade and a follower of Joseph Smith and Brigham Young. He was a member of the Mormon band that trekked westward

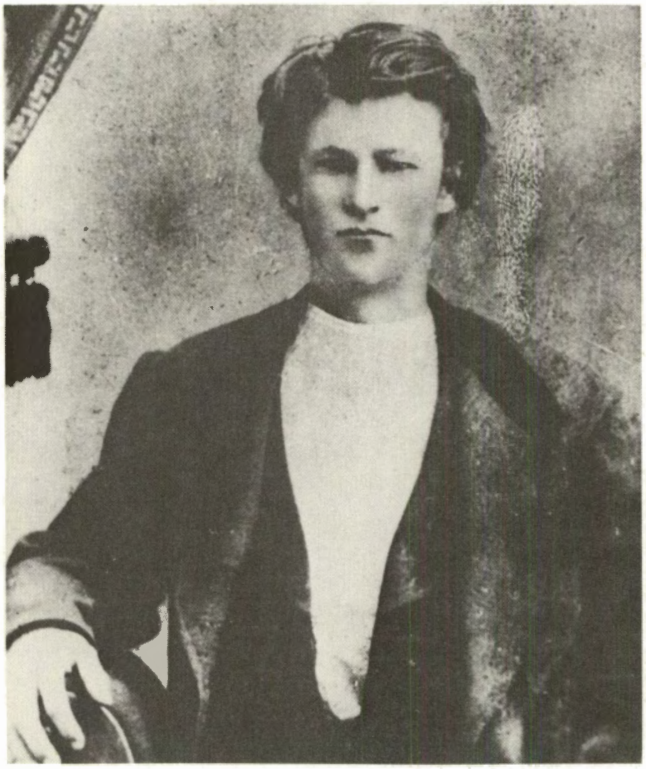


FIGURE 5–1. **John Moses Browning at age 18, by which time he had already begun to make a name for himself in the rifle business. (*U.S. Army*)**

after mobs attacked their town of Nauvoo in west central Illinois. With the first of his three wives, Jonathan settled in the village of Ogden, just north of the Mormon capital of Salt Lake City in 1852.† On 23 January 1855, John Moses Browning was born of the second wife, Elizabeth Clark.

At the early age of seven, John Moses demonstrated an interest in and aptitude for firearms-making by working in his father's shop, and at 14 he made his first rifle from scratch. Less than 10 years later in 1878, Browning completed his first rifle design for which he was awarded a patent (U.S. patent 220,271, 7 October 1879). By the time he married Rachel Teresa Child in the spring of 1879, he was a full-time gun maker, who between 1880 and 1882 with his brothers produced 600 single-shot rifles of the pattern patented by Browning. He sold the manufacturing and distribution rights to this rifle in 1883 to the Winchester Repeating Arms Company.

John M. Browning's rise to fame as an arms designer began in earnest the day T. G. Bennett, vice president and general manager of Winchester, appeared in the doorway of his Ogden, Utah, shop and offered to buy his single-shot rifle. From this start grew the famous Winchester-Browning partnership that was to last for nineteen years. Winchester became one of the largest producers of sporting arms in the United States, and almost all of Winchester's products were the work of John Browning. When Winchester discontinued single-shot rifle production in 1920, they had manufactured over 140,325 units, including the 600 made in Ogden. From October 1884 through August 1886, Winchester also bought Browning's 1886 lever-action rifle and an 1887 lever-action shotgun, plus nine other designs. After serving his obligatory two years in the field as a Mormon missionary (March 1887 to March 1889), Browning returned to work on his guns, and over the next three years he patented twenty more designs.

John Browning's work with self-loading pistols was part of his general interest in self-loading weapons. He started experimenting with self-loaders in 1889, six years after Hiram S. Maxim, when he converted a Winchester 1873 lever-action to a self-loading design by using the action of the gases at the muzzle. A machine gun using this same operating principle was built in 1890 and 1891. From this work evolved a machine gun design ultimately built and sold by Colt as the

*This chapter deals only with Browning's relations with FN and Winchester. For his dealings with Colt, see chapter 6.

†In accordance with Mormon practices, Jonathan Browning took three wives—Elizabeth Stalcup in 1826, Elizabeth Clark in 1854, and Sarah Emmett in 1859. Among them, the women produced 22 children. All the children mixed freely, with those from the second and third marriages being particularly close.

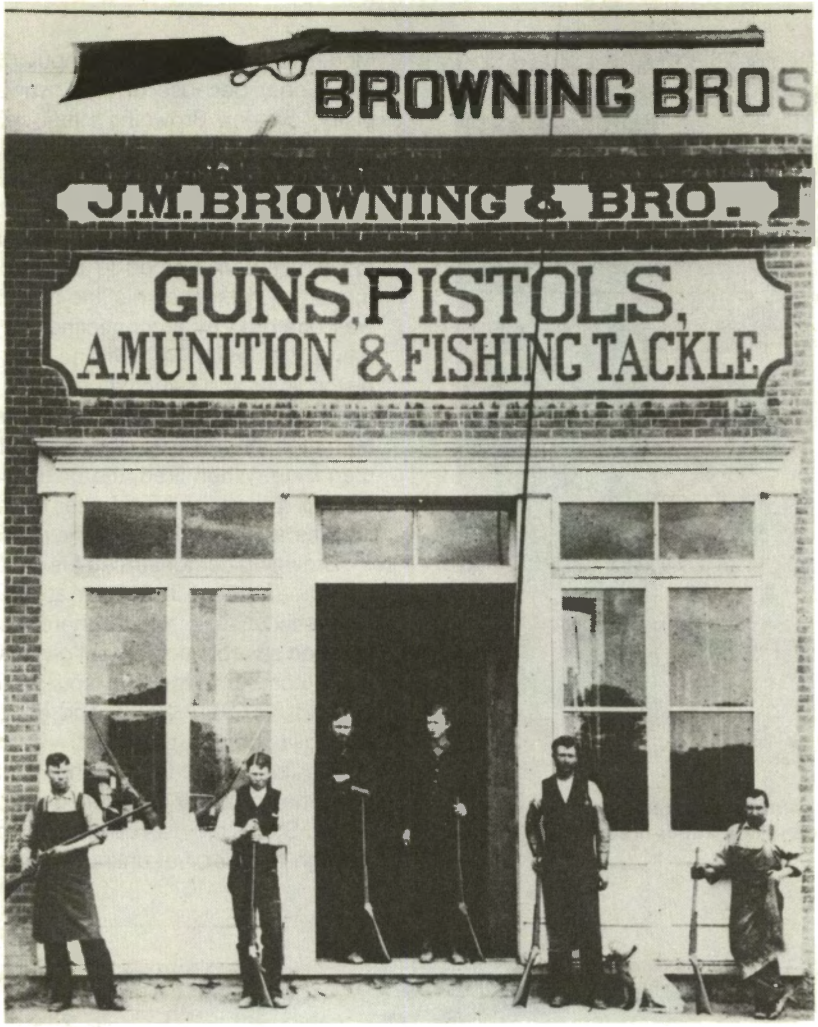


FIGURE 5–2. "The largest arms factory between Omaha and the Pacific," ca. 1882. The employees at the Browning Brothers Factory, Ogden, Utah Territory, were, from *left to right*: Sam, George, John M., Mathew S., and Ed Browning, and Frank Rushton. (*U.S. Army*)

FIGURE 5–3. John M. Browning's first patented firearm, which became the Winchester Model 1885 single-shot rifle. (*U.S. Army*)

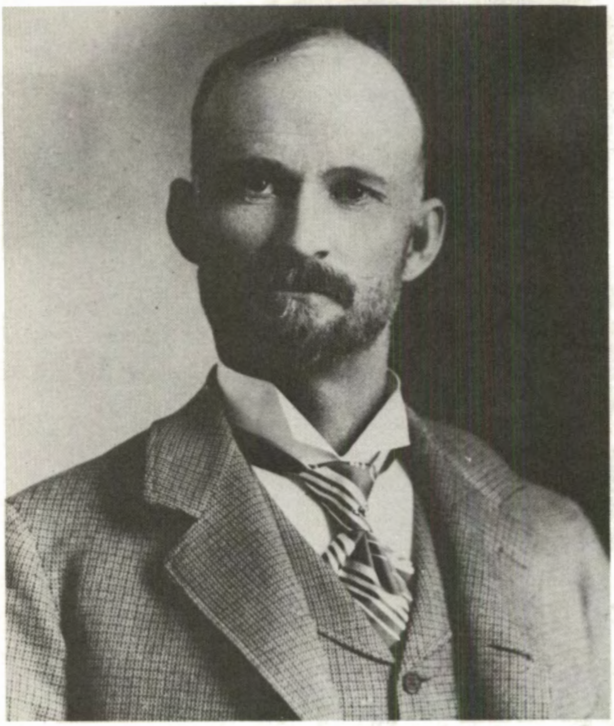


FIGURE 5–4. John M. Browning, ca. 1890, when he was beginning his experiments with self-loading firearms. (*U.S. Army*)

Model 1895 machine gun, popularly called the Browning potato digger because of its downward-arcing, gas-operating piston system. Browning's first self-loading pistol was also a gas-operated weapon.

Browning's pistol looked conventional enough when the operating mechanism was closed, but when fired it could get exciting because the flapper-type gas piston mounted on the top of the barrel arced to the rear toward the shooter and momentarily blocked his line of sight. The reciprocating bolt was operated by a connecting rod that was attached to the gas piston lever. To load, the user grasped the head of the piston lever and swung it up and to the rear. This moved the bolt to the rear and cocked the hammer. Release of the lever permitted the bolt to go forward and strip a cartridge from the magazine. When fired, the projectile passed the gas port on the top side of the barrel after traveling 102 millimeters, and the gas actuated the piston lever.

Browning demonstrated his pistol on 3 July 1895 for John H. Hall and Carl J. Ehbets at the Colt factory in Hartford, Connecticut, and shortly thereafter the designer and Colt reached a verbal agreement giving Colt the production rights. In September, Browning applied for a patent (U.S. patent 580,923, 20 April 1897), and on 24 July 1896 he and Hall signed a formal agreement regarding this and three other pistols (see chapter 6). In his contract with Colt, Browning gave the company distribution rights for his handguns in the United States only, as he planned to sell his pistols in Europe through another, yet unknown, manufacturer.

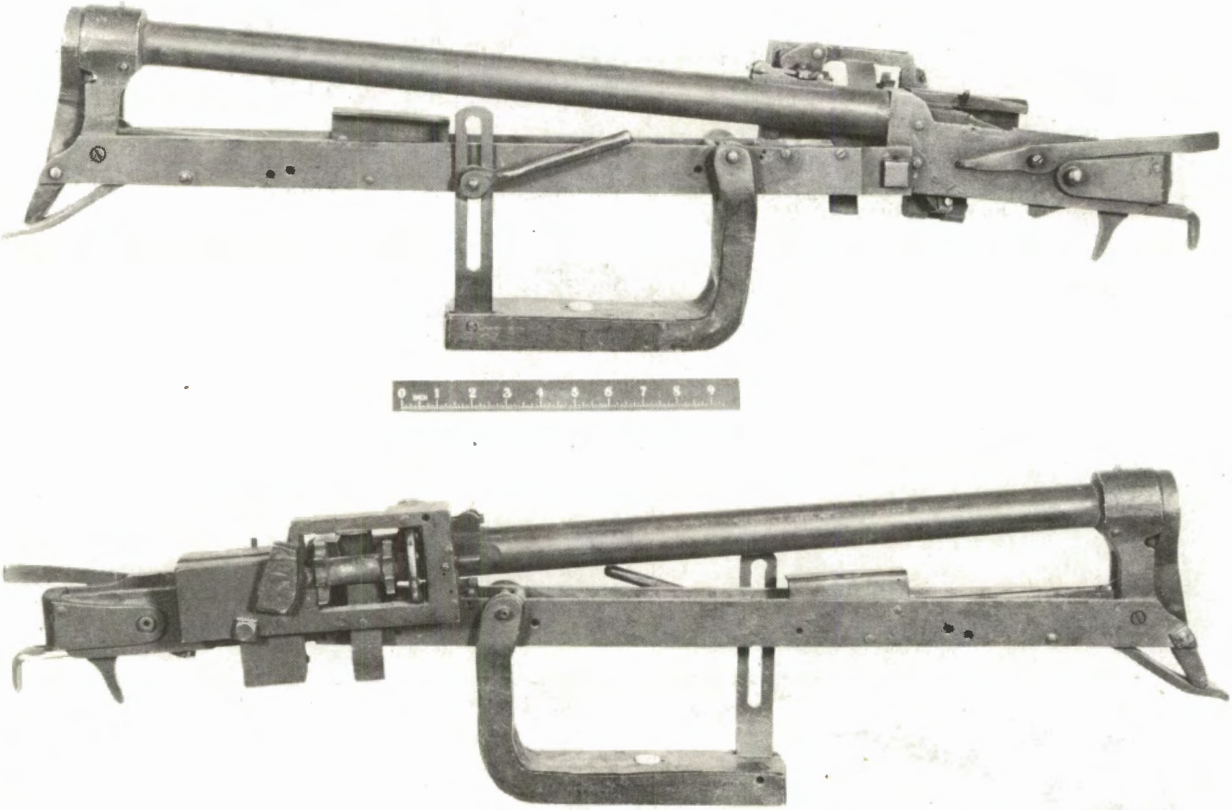


FIGURE 5–5. This ungainly-looking contraption was John Browning's first machine gun, which he created during 1890 and 1891. He received U.S. patent number 471,783 on 29 March 1892 for this .45-70 caliber (11.43mm) weapon. Like in his first modification of the Winchester Model 1873 rifle, the gases escaping from the muzzle drove the flapper-type muzzle device forward to actuate the gun. With a mount, the weapon weighed 18 kilograms. (*U.S. Army*)

FIGURE 5–6. Browning's second shoulder-fired, self-loading firearm, patented in the United States on 20 August 1895 (patent number 544,661). This rifle embodied the basic flapper-type gas system later used in the Model 1895 Colt machine guns. (*U.S. Army*)

FIGURE 5–7. Browning's first self-loading pistol was a gas-operated 9mm (.38 caliber) gun. The arrow indicates the direction of the movement of the gas piston lever. With an overall length of 216 millimeters, it sported a 146-millimeter barrel and weighed 964 grams. Browning used a seven-shot box magazine with this design. (*U.S. Army*)

FIGURE 5–8. Patented on 20 April 1897, this Browning pistol was the first step in the evolution toward the Fabrique Nationale Modèle 1899/1900. Colt had the American and British sales rights under their contract with Browning, but they never built the pistol. (*Browning, U.S. Army*)

Browning had a specific pistol and a specific cartridge in mind for the European market. The cartridge was 7.65 × 17mm, with ever so slight a rim at the base of the case. This case type would become known as semi-rimmed (SR), and the 7.65mm round came to be called the world over the 7.65mm Browning. Browning designed a blowback pistol in 1896 and 1897, and Carl Ehbets, Colt's technical wizard and patent attorney, filed the patent papers for Browning in December 1897 (U.S. patent 621,747, 21 March 1899).* Colt, however, was seemingly not interested in manufacturing a "pocket" pistol, but a former Hartford resident, Hart O. Berg, was intrigued by its possibilities. In the spring of 1897, Berg, a commercial director of Fabrique Nationale d'Armes de Guerre in Herstal, in America studying the bicycles being

*Related European patents included British patent 22,455 of 25 October 1898 (obtained through Browning's agent, Sidney Pitt) and Deutsches Reich Patent 101,077 of 6 February 1898.

produced there, took Browning's handmade model back to Belgium to discuss its possible manufacture with the other members of FN's board.

When Berg presented the Browning pistol to Henry Frenay, FN's general manager, and members of the company's Conseil d'Administration (board of directors) in June 1897, the men were enthusiastic over the new design. It was subjected to some test-firings at FN, and after it had been shot 500 times without a single misfire, the managers moved to purchase the rights to manufacture it. An agreement signed by John Browning and Baron Charles de Marmol, president of Fabrique Nationale, on 17 July 1897, began an association that would continue until Browning's death in 1926.

FABRIQUE NATIONALE

Fabrique Nationale d'Armes de Guerre was established in 1889 on the heels of the Belgian government's decision to build the Model 1888 Mauser military rifle. An amalgamated group of Liège gun makers—les Fabricants d'Armes Réunis—had been parceling out government contracts among its various factories and workshops, but General Pontus, Belgian Minister of War, wanted a single source of production for rifles with interchangeable parts. This was at once both a technological challenge and an economic threat to the individual arms companies. Each wanted a share in producing the new rifle, but none was capable alone. During 1887 and early 1888, the Ministry of War's pending order for rifles was the topic of spirited discussions in the Liégeoise arms community. Three companies—Auguste Francotte & Cie., the Manufacture Liégeoise d'Armes à Feu (a cooperative manufacturer), and the Fabricants d'Armes Réunis (producer of the Albini-Braendlin single-shot rifle used by the Belgian army)—seemed to be in serious competition for the new government order. On 28 August 1888, l'Inspection des Armes de Guerre (the Government Arms Inspectorate) publicly requested bids from the three for 150,000 rifles, the pattern to be chosen later (designs being considered included Mannlicher, Pieper, Nagant, and Schulhof). The Fabricants d'Armes Réunis worked to turn its competitors into allies, which resulted in the creation of a new company on 15 October 1888 capitalized at three million francs ($579,000).

Controversy prevailed within the arms fraternity about investing money in this enterprise. Joseph Janssen and Henri Pieper wanted to invest directly in the new firm, and they wanted to include financiers, such as the bankers, le Crédit Général Liégeoise, in the establishment of the manufactory to ensure its fiscal stability. The brothers Emile and Léon Nagant and Auguste and Charles Francotte wanted to participate in the new enterprise, but they did not want to tie up their capital. It was finally agreed that there would be two classes of shares: capital shares backed by specific amounts of money (two-thirds) and common shares not backed by money but by a promise to provide capital if the funds were required (one-third). Over time, the capital shares would be refunded and converted to common shares.

FIGURE 5–9. Browning's prototype of the 7.65mm Modèle 1899/1900 FN pistol. (*U.S. Army*)

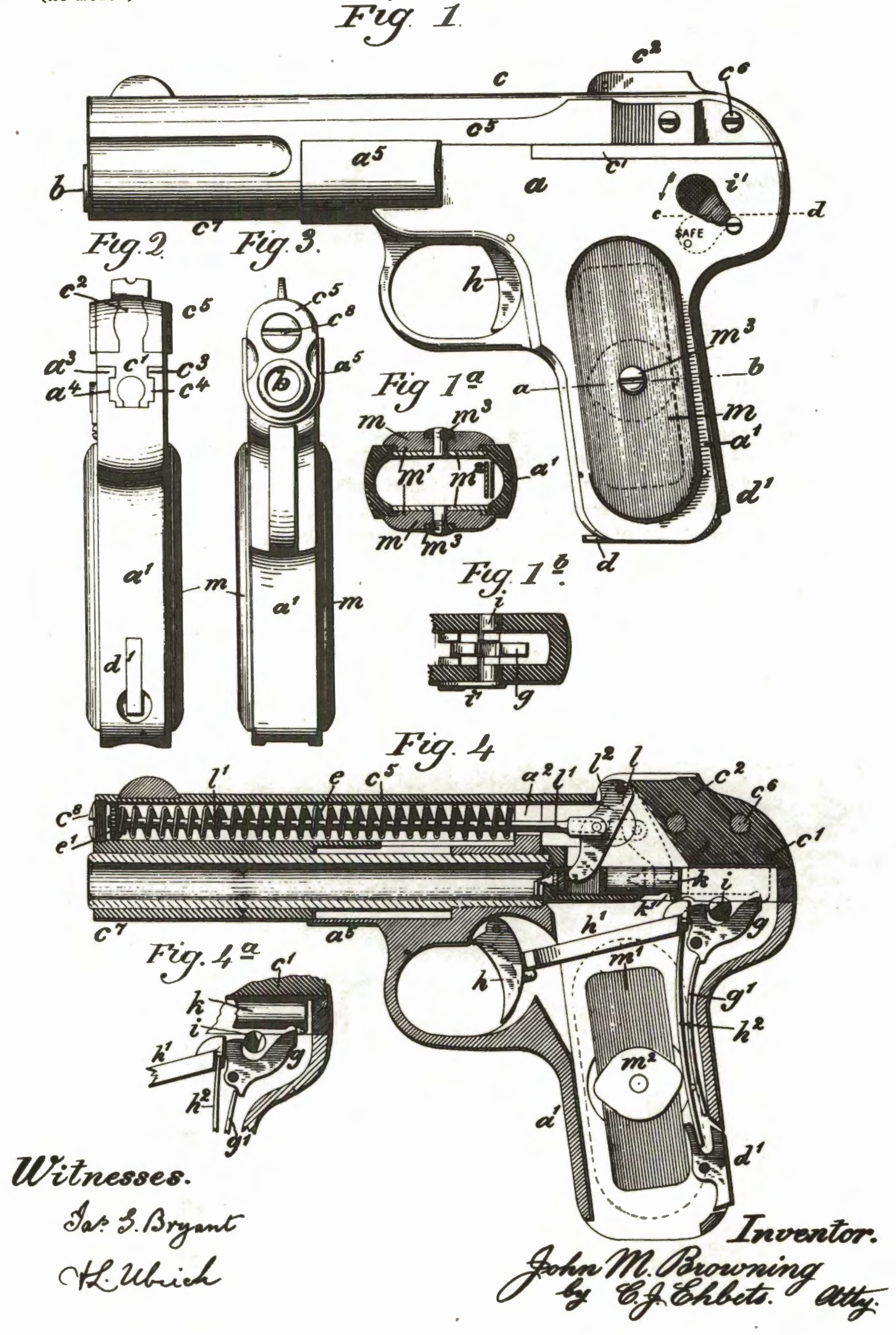
No. 621,747. Patented Mar. 21, 1899.

J. M. BROWNING.

GAS OPERATED FIREARM.

(Application filed Dec. 28, 1897.)

(No Model.) 2 Sheets—Sheet 1.



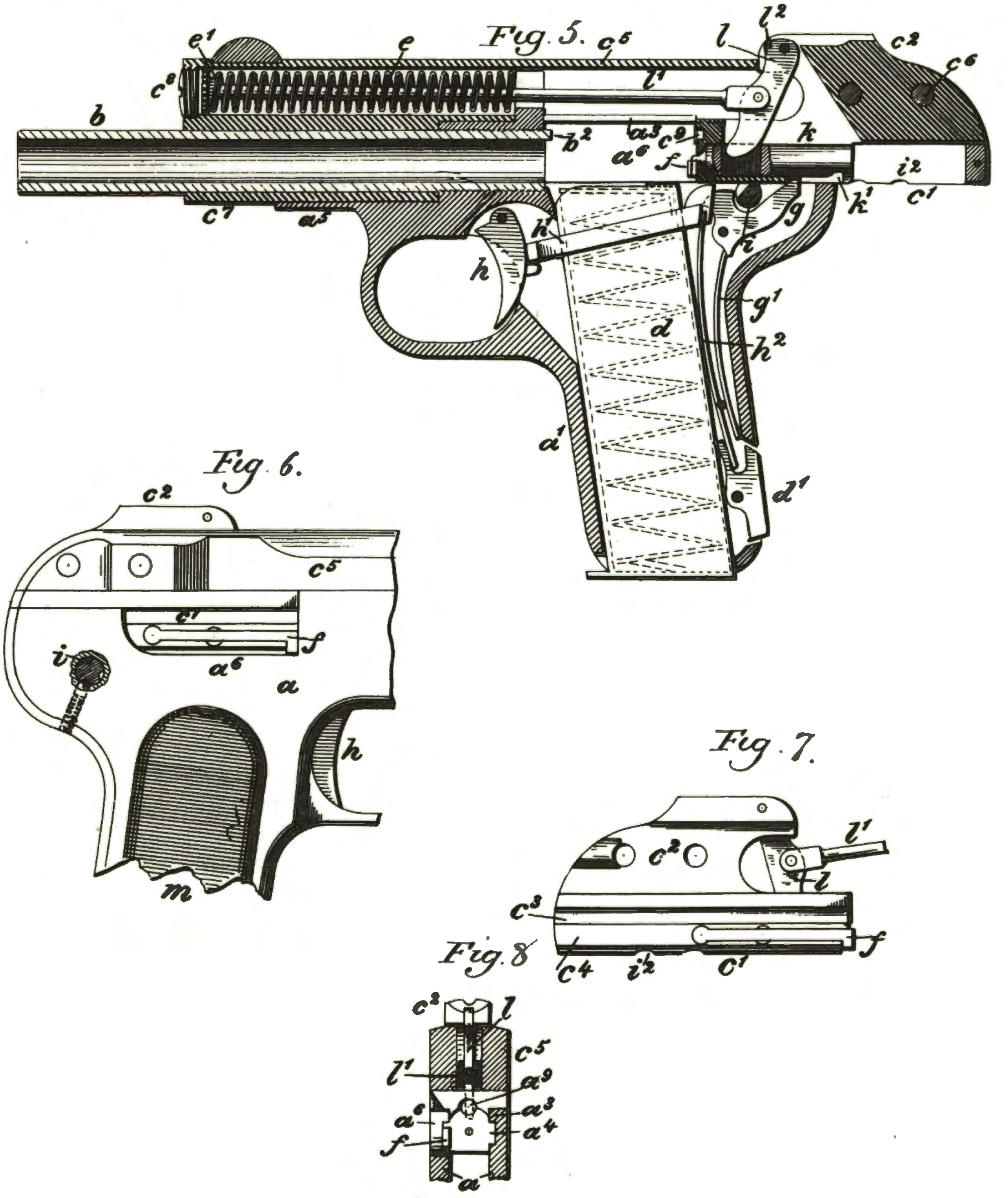
No. 621,747. Patented Mar. 21, 1899.

J. M. BROWNING.

GAS OPERATED FIREARM.

(Application filed Dec. 28, 1897.)

(No Model.) 2 Sheets—Sheet 2.



Witnesses.

Jas. S. Bryant.

A. L. Ulrich

Inventor.

John M. Browning

by C. J. Ehbets. Atty.

FIGURE 5–10. Drawings submitted with Browning's application for a patent for his blowback pocket pistol. (*U.S. Patent Office*)

By the spring of 1888, the arms makers had decided to establish a completely new factory on a new site and to acquire the finest machine tools available from Pratt and Whitney of Hartford, Connecticut and Ludwig Loewe und Companie of Berlin. Ultimately, they purchased all of their machinery from Ludwig Loewe. In December, the firm was named Fabrique Nationale d'Armes de Guerre, and on 3 July 1889 the company was officially registered with the notary in Liège. Table 5–1, which shows the apportionment of shares in FN, reads like a "who's who" of the Liège arms industry.

Beneath the apparent cooperation, differences continued among the investors. Shareholders Pieper, Janssen, and Allard Bormans of Dresse-Laloux et Cie. favored the creation of a long-term organization that would stay in business beyond the Belgian army contract. On the other side, the Nagants, Francotte, Pirlot, and Frésart and the Manufacture Liégeoise d'Armes à Feu wanted this new company to have a life limited to the forthcoming contract for 150,000 rifles.

One of the first actions of the general stockholders was the election of le conseil d'administration. Bormans was chosen president; Janssen, vice president; and Pieper, managing director. Other members of the board were Jules Ancion, Alban Poulet, Albert Simonis, Ernest Francotte, and Léon Nagant. On 12 July 1889, Bormans and Pieper signed a contract with the Belgian government for the manufacture of 150,000 rifles at 79 francs ($15.25) each, for a total of 11,850,000 francs ($2,287,050). The rifle design ultimately chosen was the Mauser Model 1889, and a license for this weapon was obtained from Mauser in October. It will be remembered that Ludwig Loewe und Companie owned the controlling shares in Mauser at this time, so the Belgians were in effect getting their production machinery and their weapon design from the same source. The cost of the tooling fixtures, jigs, and inspection equipment was 219,000 marks or 240,276 francs (about $50,000).

After land had been acquired and a new factory built, the company began production of the Model 1889 rifle, with the first ones being assembled on the last day of 1891. The contract was completed three years later. By the summer of 1894, several members of the FN organization were beginning to complain that the firm was becoming a permanent source of competition for their own factories. On 12 July, directors Francotte and Nagant resigned from the board and sold their shares to third parties. A decision that fall to redeem the 6,000 capital shares with 6,000 bonds worth 500 francs ($96.50) each to be paid off after 10 years (with 6 percent interest) seemed to indicate that the company would indeed be dissolved in the near future. In the winter of 1894–1895, FN went through a severe legal crisis when they tried to sell the Spanish Model 1893 Mauser rifle to Chile. Mauser objected to this unlicensed proposal, and FN was forced to back down and watch Chile purchase its rifles from Germany. Unable to beat the Mauser lawyers and unsuccessful at having any of Mauser's many patents cancelled, a panic swept FN, during which J. Chantraine, general manager, and Janssen, president, resigned. On 6 February 1896, the five remaining board members—Bormans, Pirlot, Simmonis, Dumoulin, and Ancion—also left after publicly announcing that Ludwig Loewe und Companie had purchased more than half of the FN shares. Among the new board members were Israel Loewe and Alexis Riese of the Ludwig Loewe board, and J. Dallemagne, G. De Laveleye, and Charles del Marmol. A. Riese and Henri Pieper acted as managing directors.

FN's new board worked out an arrangement with Mauser whereby FN would be allocated some of Mauser's production work. When the Deutche Waffen-und Munitionsfabriken (DWM) was established in 1897, the Loewe shares in FN and Mauser were assigned to the new German corporation, which subsequently divided Mauser rifle production among Mauser (20 percent), DWM (32.5 percent), FN (15 percent), and the Österreichische Waffenfabrik at Steyr (32.5 percent). With such a small share, the local management of FN sought other products that they could manufacture within the limitations imposed upon them by the Loewe-DWM cartel. One of the driving forces behind the company's expanded product

TABLE 5-1 SHAREHOLDERS OF FABRIQUE NATIONALE D'ARMES DE GUERRE, 1889

	Capital Shares	*Common Shares*
Albert Simonis, fabricant d'armes	**300**	**200**
Jules Ancion & Cie., fabricants d'armes	**600**	**200**
Dresse-Laloux & Cie., societé en commandite, fabricants d'armes	**600**	**200**
Manufacture Liégeoise d'armes à feu	**600**	**200**
Dumoulin frères, fabricants d'armes	**600**	**200**
Joseph Janssen, fabricant d'armes	**600**	**200**
Henri Pieper, fabricant d'armes	**1200**	**200**
Pirlot et Frésart, fabricants d'armes	**600**	**200**
Crédit Général Liégeois, société anonyme	**600**	**—**
Nicolas Vivario, proprietaire	**300**	**—**
Auguste Francotte, fabricant d'armes	**—**	**200**
Emile et Léon Nagant, fabricants d'armes	**—**	**200**
Total	**6000**	**2000**

line was the new general manager, Henri Frenay (appointed 27 March 1896), who became the first director-general in 1899. In 1896, FN introduced its first bicycles, and shortly thereafter began to manufacture sporting rifles and shotguns, a field that had been off limits under the original ownership. Fabrique Nationale became a competitor across the firearms spectrum with the older Liège arms makers. Still, all of these projects did not take full advantage of FN's production capacity, nor did they provide enough work to keep the factory's employees busy.

FABRIQUE NATIONALE AND BROWNING

It was at this juncture that Hart Berg encountered John Browning and his pocket pistol. This handgun was a natural product for FN because it was suited for mass production and it was not controlled by the DWM organization. After eighteen months' preparation, Fabrique Nationale delivered the first Browning pistols in January 1899.

Modèle 1899–1900 Pistolet Automatique Browning

Company records indicate that 3,900 pistols were manufactured in 1899. The new product was called the Modèle 1899. On 3 July 1900, the Belgian government adopted a slightly modified version of it for military officers, called the Modèle 1900. Although the basic Browning design had been developed to be produced relatively easily on unsophisticated tools, the Modèle 1900 was even further simplified to improve its mass producibility. The adopted model was slightly lighter (630 grams, as compared to 765 grams) and shorter (163 millimeters overall, as compared to 183 millimeters), with a 102-millimeter barrel (as compared to 122 millimeters). The production Modèle 1900 also had larger grip plates, a lanyard ring, and a slight step on the frame above the trigger.

The first government order for Modèle 1900 pistols was for 20,000 units. By August 1904, 100,000 Modèle 1900s had been built, 500,000 by 1909, for a total of 724,450 when production was terminated in 1910 and 1911. Although the FN managers had wanted Browning to assist them personally in establishing production of his pistol, he would not. Indeed, he put off his first visit to Liège until his break with Winchester forced him to discuss several new projects with Fabrique Nationale.

Browning had tried to sell his self-loading shotgun to Winchester (who said it was too "modern") and to Remington (their president, Marcellus Hartley, had just died and the management was in confusion) without success, so he went to Belgium. He arrived on a depressing, rainy February evening that did little to lift his spirits or give him much hope for the future. The exuberance of his welcome at FN by Henri Frenay and others was both a relief and an embarrassment. At long last, the Belgians met the man whose pistol had given them so much to be happy about—good business and handsome profits. They looked at his shotgun and saw the same potential. On 24 March 1902, Browning and FN consummated a contract for the manufacture and distribution of his new gun. The American designer stayed in Liège for three months while he oversaw the preparation of the production pilot models, one of which was fired 40,000 times.

John Browning was an egalitarian, who could work with nearly everyone. He was equally at home in FN's board rooms and on the shop floor. The pages of his French-English-English-French pocket dictionary were smudged by the grease from his hands. Among the workmen, he became known by the simple but significant title *Le Maître* the Master. Liège became Browning's second home for the next 24 years, where he was greeted with affection and respect each time he returned.

Modèle 1903 Pistolet Automatique Grande Modèle

Browning apparently brought a model of another pistol design to Liège in 1902 (U.S. patent 747,585, 3 April 1902). Prototypes were completed in June when the British military attache in Brussels forwarded a photograph of the new handgun to the British Small Arms Committee. Development of the FN Modèle 1903 progressed slowly. When tested by the Swedish military in 1903 and 1904, it was still being called the "experimental model of 1903." It fired a 7.1-gram projectile from a 9 × 20mm SR cartridge at a velocity of 335 meters per second. Called the *pistolet automatique grand modèle,* the Modèle 1903's recoil spring was positioned beneath the barrel, and the pistol used a hammer-type firing mechanism instead of the Modèle 1900's striker-type.

While many armies rejected this pistol outright because it was a blow-back weapon, the Belgians, Czechs (?), Dutch, Russians, Swedes, Turks, and Paraguayans adopted it for their armed forces. Fabrique Nationale produced the 1903 pistol until about 1927, but the total number made was relatively small—58,442. Sweden's Husqvarna Vapenfabriks manufactured 94,731 units (88,586 for the military; 6,145 for commercial sale) in 1917–1942. (Domestic production of the "M/07 pistol" in Sweden began after FN's factory had been occupied by German armed forces in World War I so that Sweden would continue to have a supply of handguns for its troops). FN-built Mle 1903 pistols were marked "FABRIQUE NATIONALE D'ARMES DE GUERRE HERSTAL BELGIQUE/BROWNING'S PATENT DEPOSE" on the left side of the slide. Husqvarna-made pistols were marked on the same side with "HUSQVARNA VAPENFABRIKS AKTIEBOLAG." Some later guns carried the words "SYSTEM BROWNING" below the marker's name. Approximately 5,000 Browning of this pattern were sold to Russia in 1904, and a small lot was sent to Paraguay. In the Netherlands, it was called the Pistool M/1911. Production of the Mle 1903 is known to have totaled 153,173.

Modèle 1910 Pistolet Automatique Browning

By late 1908, John Browning had completed the design of a simplified pocket pistol that could be made available in 7.65mm or 9mm Browning. The basic pistol was patented in Belgium on 28 July 1909, and included some elements that

FIGURE 5–11. The 100,000th and 500,000th Modèle 1900 FN pistols were given to John Browning by the manufacturer. (*U.S. Army*)

FIGURE 5–12. A typical production version of the 7.65mm × 17mm SR Modèle 1900 (serial number 509,472). It was 163 millimeters long overall, with a 102-millimeter barrel (rifling/twist, 6R). It weighed 630 grams and used a seven-shot box magazine. (*Krcma*)

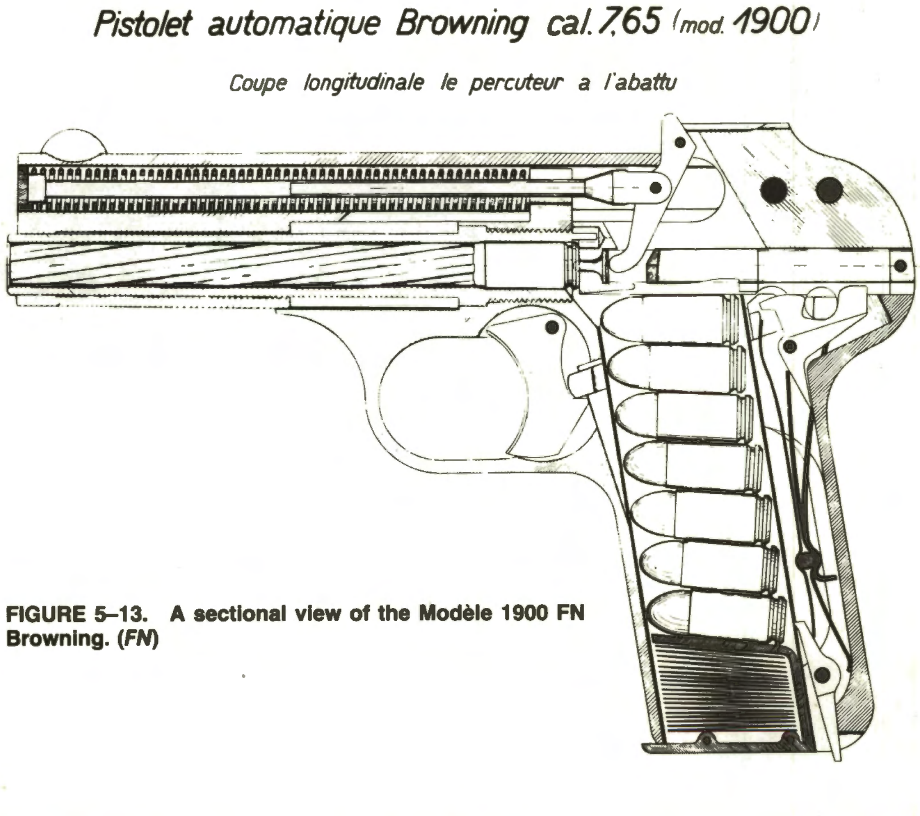


FIGURE 5–13. A sectional view of the Modèle 1900 FN Browning. (*FN*)

had been patented previously, such as the mechanical safety. Unlike its predecessors, in which the recoil spring lay parallel to the barrel (above the barrel in the 1900 and below in the 1903), the recoil spring in the Modèle 1910 was mounted around the barrel. The barrel thus acted as the spring guide, and the designer cut a shoulder onto the barrel to provide a bearing surface for the spring. In this pistol, Browning reverted to the striker-type firing mechanism, which he borrowed from the 6.35mm Modèle 1906 vest-pocket pistol. The 1910 design had a magazine disconnect safety (the pistol could not be fired if the magazine were not locked in place), a grip safety, and the mechanical hammer-blocking safety. Together, these three features were called *triple surete* by FN and were much advertised during the early years of the pistol's manufacture. Production of the Modèle 1910 started in 1910 and continued until the second German invasion of Belgium in 1940. Revived in the mid-1950s, more than 575,000 had been fabricated a decade later.

Although this pistol was never adopted in any significant quantities by military forces, it was used widely by police organizations, including those of Denmark, Sweden, and Japan. Still, this was one of the most widely copied of Browning's pistols. Amberg in Finland made an unauthorized copy in 1912 and 1913. The Czech Praga was a close copy. After the First World War, DWM in Germany produced an almost exact copy, too.

Modèle 1910/22 Pistolet Automatique Browning

The Modèle 1910/22 was essentially a variant of the Modèle 10, in which the barrel and grip were lengthened. In February 1923, the Kingdom of Serbs, Croats, and Slovenes (now

FIGURE 5–14. Browning's prototype model for the 9mm FN *Modèle 1903 pistolet automatique grande modèle*. (*U.S. Army*)

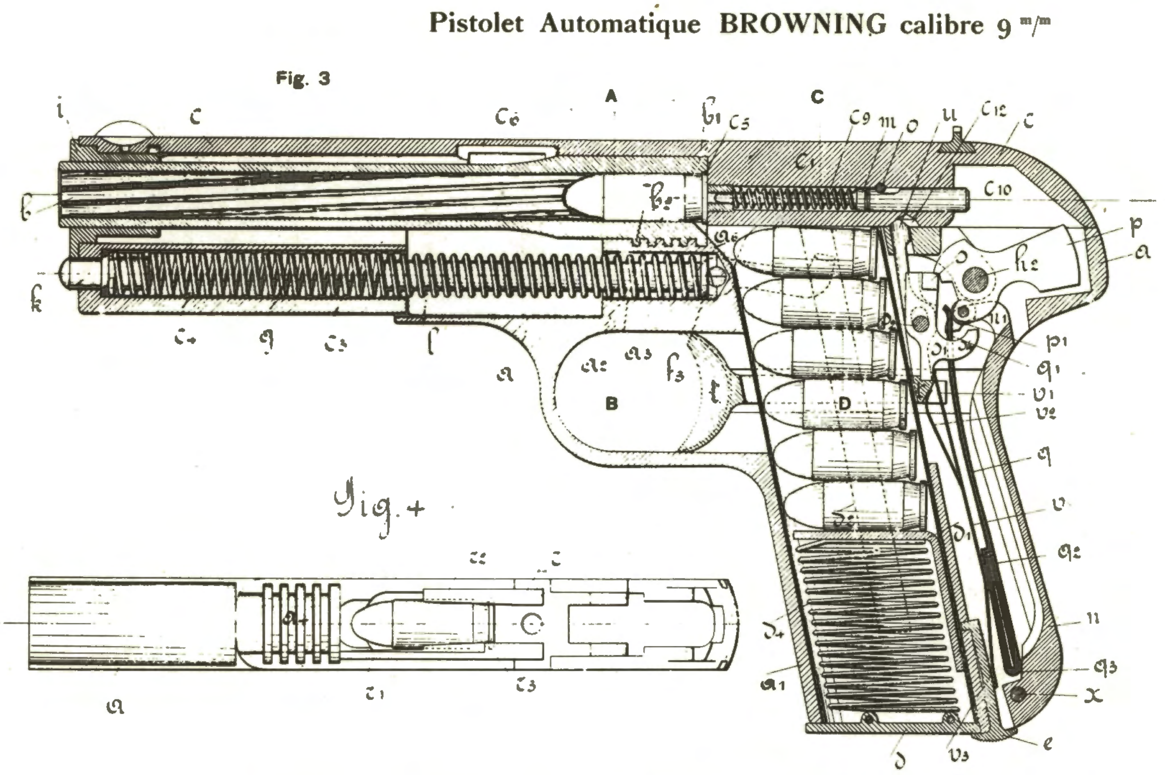


FIGURE 5–15. Sectional view of the 9mm FN Modèle 1903. (*FN*)

Yugoslavia) ordered 60,000 pistols from Fabrique Nationale, which required 114-millimeter barrels and 8-shot magazines. Since one order did not justify the design of a completely new pistol, FN's Bureau d'Etudes (Research and Development Office) created this variant of the Modèle 1910. The longer barrel was fitted to the Modèle 1910 and the slide extended by a sheet-metal cap that was fixed to the slide by a bayonet joint and spring-loaded catch. The frame was lengthened to accommodate the longer magazine, and a front sight was affixed to the slide extension. A lanyard loop was also attached to the left side of the frame. In this way, the engineers at FN were able to fulfill the contract with a minimum of changes to their production tooling. Many of these pistols were used by troops led by the anti-Communist General Mikhailovich and came to be unofficially called "Mikhailovich models."

Before 1940, FN supplied a number of Modèle 1910/22 pistols to military forces outside Belgium. Between 1926 and 1928, the Dutch bought an unspecified number, which they called the *Pistool M/25, No. 1.* Yugoslavia purchased additional pistols throughout the 1930s. Danish police ordered the 7.65mm version, while police in Belgium, France, Sweden, and Czechoslovakia used the 9mm model. Following the German takeover of FN in 1940, the Modèle 1910/22 was built by the Germans as the *Pistole 626(b)* in 7.65mm Browning and as the 641(b) in 9mm Browning. During the occupation, 363,200 units were accepted by Heereswaffenamt (Ordnance) inspectors. Most of these were in 7.65mm. The German's yearly production can be summarized as follows: in 1940, 200; 1941, 45,000; 1942, 69,000; 1943, 166,000; and 1944, 83,000. After 1942 under the supervision of the Nazis, Modèle 1910/22 quality deteriorated sharply. It is estimated that more than 760,000 Modèle 1910/22 pistols had been fabricated by the early 1960s.

The two world wars had a significant impact on Fabrique Nationale. On 31 January 1914, the factory manufactured its one millionth Browning pistol (a 6.35 Modèle 1906), which was presented to John Browning, along with the Cross of Knighthood of the Order of Leopold, which was bestowed by King Albert of Belgium.* Browning then went home, not to return to Liège for four years. The forces of the German Kaiser invaded Belgium on 5 August 1914 and took over the FN factory on the 16th. Although the German government was eager to keep the factory in operation, the board of directors responded to the suggestion by closing the works and paying off the work force. Occupying authorities subsequently requisitioned the remaining stock of arms and a major portion of the factory's machine tools. In 1915, FN managers decided to build the equipment needed to replace that which had been taken by the invaders, but director-general Alfred Andri, who had replaced Frenay when he died in 1906, refused to renew arms production. He was later imprisoned by the Germans for his stubborn lack of cooperation. After all else failed, the German authorities used the factory as a motor vehicle repair depot.

After the 1914–1918 war, the Union Financière et Industrie Liégeoise managed to purchase DWM's 5,700 shares in Fabrique Nationale. Once again a wholly Belgian-owned firm,

*Actually, there were two pistols, both gold inlayed with the legend *Un million.* One was given to Browning, and one was presented to King Albert.

1. Slide
2. Barrel bushing
3. Barrel
4. Recoil spring retainer
5. Recoil spring guide
6. Recoil spring
7. Frame (receiver)
8. Safety
9. Sear spring
10. Hammer spring
11. Grip safety
12. Magazine
13. Magazine catch
14. Grip safety pin
15. Ejector and cartridge guide
16. Slide stop
17. Slide stop
18. Sear
19. Disconnector
20. Trigger
21. Hammer
22. Hammer roll
23. Roll pin
24. Firing pin extension
25. Firing pin
26. Firing pin spring
27. Extractor
28. Extractor spring
29. Firing pin retaining spring
30. Extractor spring
31. Grip plate
32. Grip plate screw

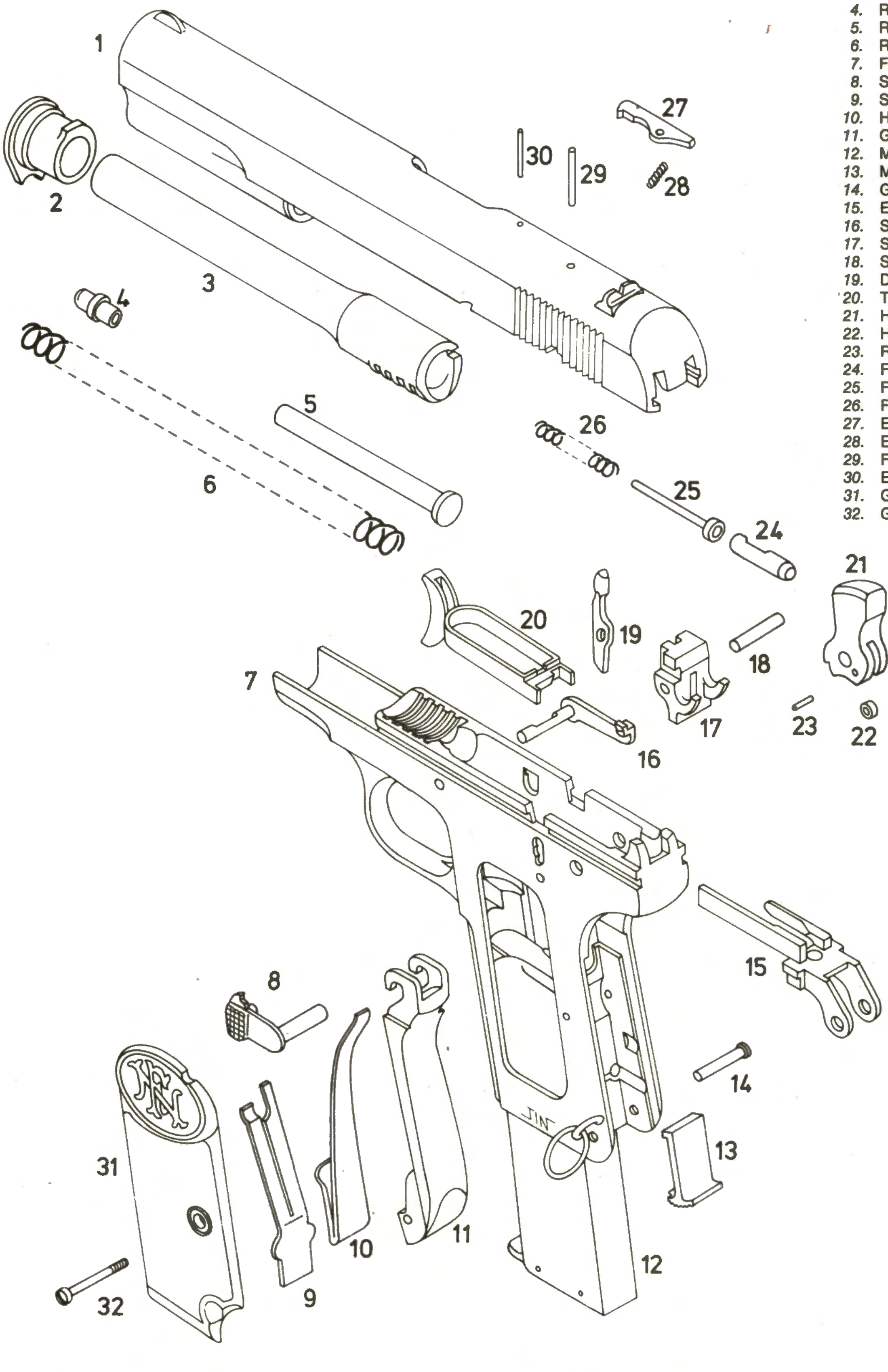


FIGURE 5–16. Exploded view of the 9mm Browning Modèle 1903 pistol. (*Jimbo*)

FIGURE 5–17. The 9mm FN Browning Modèle 1903 with wooden shoulder stock-holster and special ten-shot magazine. The stock also held a spare magazine and cleaning rod. Pistols for which stocks were issued had special rails machined into the base of the frame. (*Krcma, Krcma, FN*)

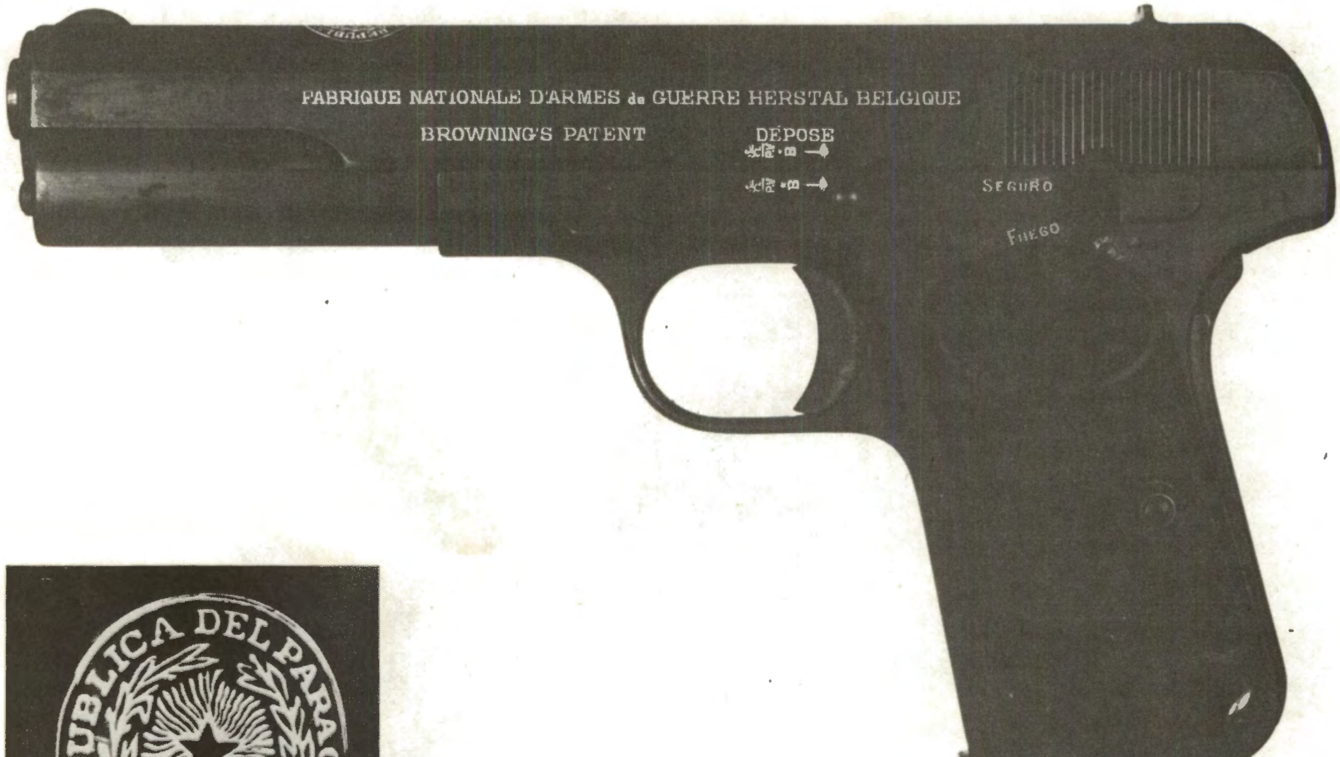


FIGURE 5–18. The Modelo Paraguayo 1927 9mm FN Browning pistol (Modèle 1903). A recoil-operated design, it weighed 930 grams and was 205 millimeters long, with a 128-millimeter barrel (rifling/twist, 6/R). It was designed for use with a seven-shot box magazine unless it was fitted for a shoulder stock, in which case it took a ten-shot magazine. (*Krcma*)

FIGURE 5–19. **A Husqvarna-made 9mm Browning Long caliber Modèle 1903 pistol produced for the Swedish army (M/07) as it compared with a Tokarev pistol. The Husqvarna pistol carried the regimental marking 12 N° 801, gun number 801 of the 12th Regiment. (*Aberman*)**

FIGURE 5–20 **An FN-made 9mm Browning Long caliber Modèle 1903, which was purchased by the Swedish (I26 N° 40 was a Swedish property mark) and subsequently used by Finnish defense forces (note SA property mark). (*Tokoi/Sotamuseo*)**

FIGURE 5–21. John Browning's prototype for the FN 7.65mm Modèle 1910 pistol. (*U.S. Army, FN*)

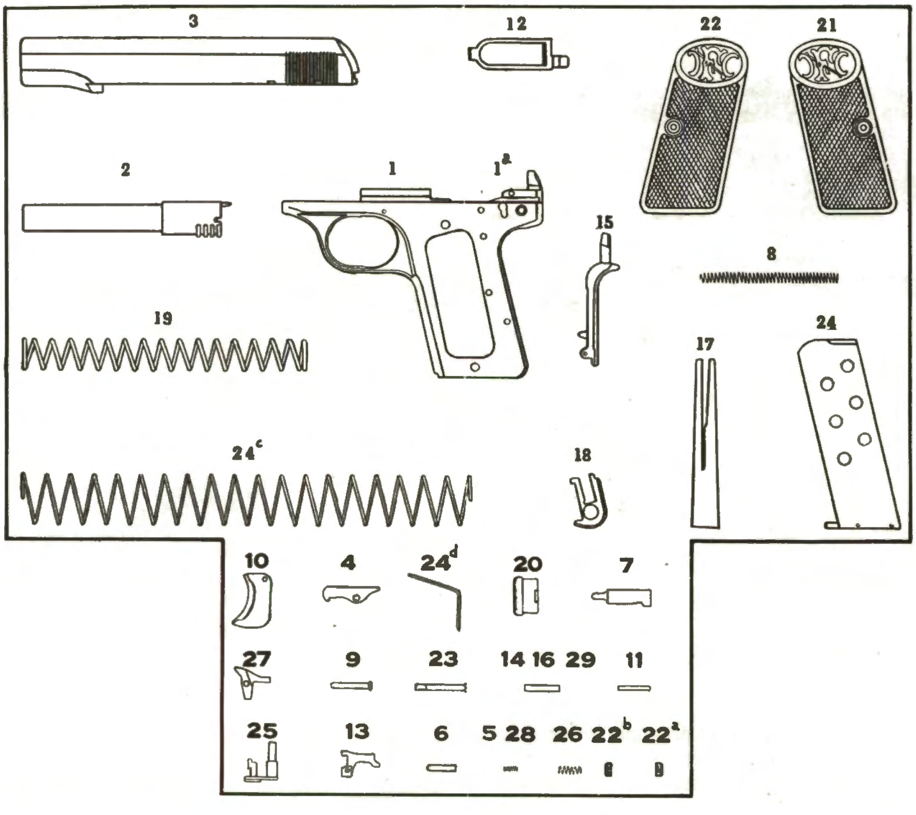


FIGURE 5–22. A disassembled view of the 7.65mm FN Browning Modèle 1910 pistol from an FN catalog. (*FN*)

FIGURE 5–23. A 7.65 × 17mm SR FN Browning Modèle 1910 pistol (serial number 262,683). This 570-gram gun measured 152 millimeters with a 99-millimeter barrel. Recoil-operated, it was also available in 9 × 17mm SR (560 grams). The 7.65mm version used a seven-shot box magazine; the 9mm, a six-shot magazine. (*FN*)

the factory relied heavily at first on its pistol production to revive its operations. Browning renewed his visits, and on his last he reviewed preparations for the production of his subsequently famous superposed (over-and-under) shotgun. During that last visit, his 61st trip to Liège, the Master was taken ill and died shortly thereafter on 26 November 1926. His passing stirred the emotions of thousands in Liège. Almost the entire work force passed by his bier, which was placed in the FN board room. Browning's genius and his mechanical legacy lived on in the form of the pistols, rifles, shotguns, and machine guns he had created.

Modèle 1935 Pistolet Automatique, Grande Puissance

About four years before his death, John Browning began to work on a new handgun, one which would provide the basis for the *Modèle 1935 pistolet automatique, Grand Puissance,* or the Model 1935 High Power pistol as it is known in English-speaking countries. This 9mm Parabellum pistol was undertaken in part because of the interest expressed by the French government. In his 28 June 1923 application for a U.S. patent on this pistol, Browning wrote:

> A main object of the present invention is to provide an automatic pistol . . . which is strong, simple in construction, accurate, reliable and safe in operation, and easy and economical of manufacture. This object is attained by simplifying the mechanism employed in firearms of this class by providing a novel improved construction and co-ordination of certain members of the mechanism, thereby enabling these parts to perform several distinct functions and organizing them in such manner that they may readily be assembled or disassembled without requiring the use of any tools or accessories.

Even such parts as the trigger could be removed from the frame without using tools. In this pistol, Browning abandoned the trigger stirrup used in his other handguns in favor of a connecting bar for the sear and trigger, which was mounted in the slide. The pistol could therefore fire only when the slide was completely and properly locked. "In all other positions of the breech slide, the forward end of the lever is removed from its operative relation with the trigger pawl; thus the arm cannot be fired, even if the trigger is pulled back, until the

FIGURE 5–24. A 9mm Browning Modèle 1910/22 manufactured for the Kingdom of Serbs, Croats, and Slovenes, 1923–1925. This pistol (serial number 53,586) carries an inscription in cyrillic, which translated means "Military State Property." (*Krcma*)

breech slide and barrel are fully locked and the breech closed." Though Browning employed the same basic locking principle in this new pistol as he had in the Colt Browning Model 1911 pistol, the execution was different and, he believed, improved. In the new handgun, the pivoting link used to lock and unlock the barrel was replaced with a cam block that acted on cam surfaces cut into the bottom of the barrel extension. The modified locking system was stronger, and because the barrel moved in a more linear direction along the axis, it was inherently more accurate than the Model 1911.

Many people look upon the Model 1935 as Browning's last design, and for years the people at FN promoted that idea in order to benefit from the Browning name. The Model 1935 was Browning's last brainchild but its foster father was the late Dieudonné J. Saive. This pupil of Browning's is best remembered for his design work on the Modèle 1949 *Fusil semi-automatique d'infanterie* (SAFN) and the *Fusil automatique légèr* (FAL). Early models of the new Browning pistol had a single-row magazine, largely because Browning did not believe that double-row magazine could be developed in a form that would be reliable and still provide an easy-to-grip handgun. Saive disagreed and created a double-row, 13-shot box magazine and worked it into a manageable pistol. By November 1924, the striker-firing mechanism used in the early prototypes had been replaced by an external hammer-firing mechanism. (U.S. patent 1,618,510, finally granted on 22 February 1927, three months after Browning's death, illustrated the striker-fired version.) By 1928, the final details of the Browning-Saive pistol had been completed, and it was ready for manufacture.

Production of the new handgun was originally scheduled to begin in the spring of 1929, but the collapse of the American stock market followed by an international economic crisis forced Fabrique Nationale to postpone any new projects. As the money situation worsened and depression swept Europe, the FN work force was trimmed by a series of layoffs. The employees at FN had numbered 9,138 in June 1929, but by May 1934 they had been reduced to only 2,580. The Belgian

FIGURE 5–25. The 9mm Browning caliber FN Browning Modèle 1910/22 pistol as made for the Netherlands (serial number 5891). Note the Dutch crest and the mark *W* for Wilhelmina on top of the slide. The Dutch called this pistol the *Pistool M/25 No. 1.* (*Krcma*)

FIGURE 5–26. The Modèle 1910/22 in 9 × 17mm SR. FN also made this Browning design in 7.65 × 17mm SR. The pistol, 178 millimeters long with a 114-millimeter barrel, weighed 680 grams in 9mm, 710 in 7.65mm. Recoil-operated, it used a box magazine, with an eight-shot capacity in 9mm and nine-shot capacity in 7.65mm. (*FN*)

company did not initiate production of the Browning-Saive pistol until 1934. The next year, the Belgian Army adopted it as the *Modèle 1935 pistolet automatique, Grand Puissance.*

Prior to 1939, FN recorded sales of the Modèle 1935 GP to Estonia, Lithuania, China, and Peru, but the start of another war prevented its wider distribution. About 56,500 units of this model were built before the Germans again overran Belgium. Belgian officials had known that the industrial region of Liège would be easy prey for the Germans if they crossed the frontier again and had drawn up plans to evacuate key manufacturing organizations like Fabrique Nationale, but the German blitzkrieg had moved faster than the Belgians. Wehrmact troops crossed the Belgian-German border on 10 May 1940 and entered Liège two days later. This time, the Germans were determined to keep the factory in operation. When the management again refused to cooperate, the Germans confiscated the factory in the name of the Reich and began their own production for the Wehrmacht. Managers from DWM and Mauser were placed in charge of the "DWM—Werk Luttich," as the FN factory was called by the Nazis. A new board was also recruited: Dr. Franz Scharpinet (a DWM director), kommissarischer verwaltung (director-general); Ernst Demmer (DWM), commercial manager; Dr. Emil Fess (Mauser), technical manager; David Pfeffer (Mauser), director of small arms manufacture; and Walter Henning (Mauser), director of ammunition production. More than 319,000 Modèle 1935 pistols, called the Pistole 640(b) by the Germans, were produced for the Heereswaffenamt.

During the summer of 1941, several top members of FN's former staff secretly left Belgium and traveled to Britain via France, Spain, and Portugal. Saive was among the refugees. Once in England, they went to work for the British Armaments Ministry.

After four years in German hands, the Liège area was liberated by American forces on 8 September 1944. Immediate rebuilding of the factory and the work force was complicated by the intensive V–1 bombing attacks that the Germans carried out between November 1944 and February 1945. Resuming production was further complicated by the fact that the Germans had scattered FN's machine tools throughout Belgium, Germany, and Poland. Of 1,976 machines taken from Liège, 1,228 were recovered. Some were lost, and some were kept by the Russians who liberated Poland.

Early in World War II, the John Inglis Company of Toronto, Canada, was asked to supply the Modèle 1935 GP pistol for issue to British, Canadian, Chinese, and Greek troops. All of the contracts were handled through the Canadian Department of Munitions and Supply. Inglis engineers worked from six FN-made pistols to prepare the necessary engineering drawings. Full interchangeability of parts was required, and the screws and some other components were American National Form standards instead of metric standards. Wherever possible, Inglis introduced innovative manufacturing techniques. For example, a *flame pantograph* was used to trace a master pattern for the frame blank on a large sheet of steel, while a series of cutting torches flame-cut the frame. The

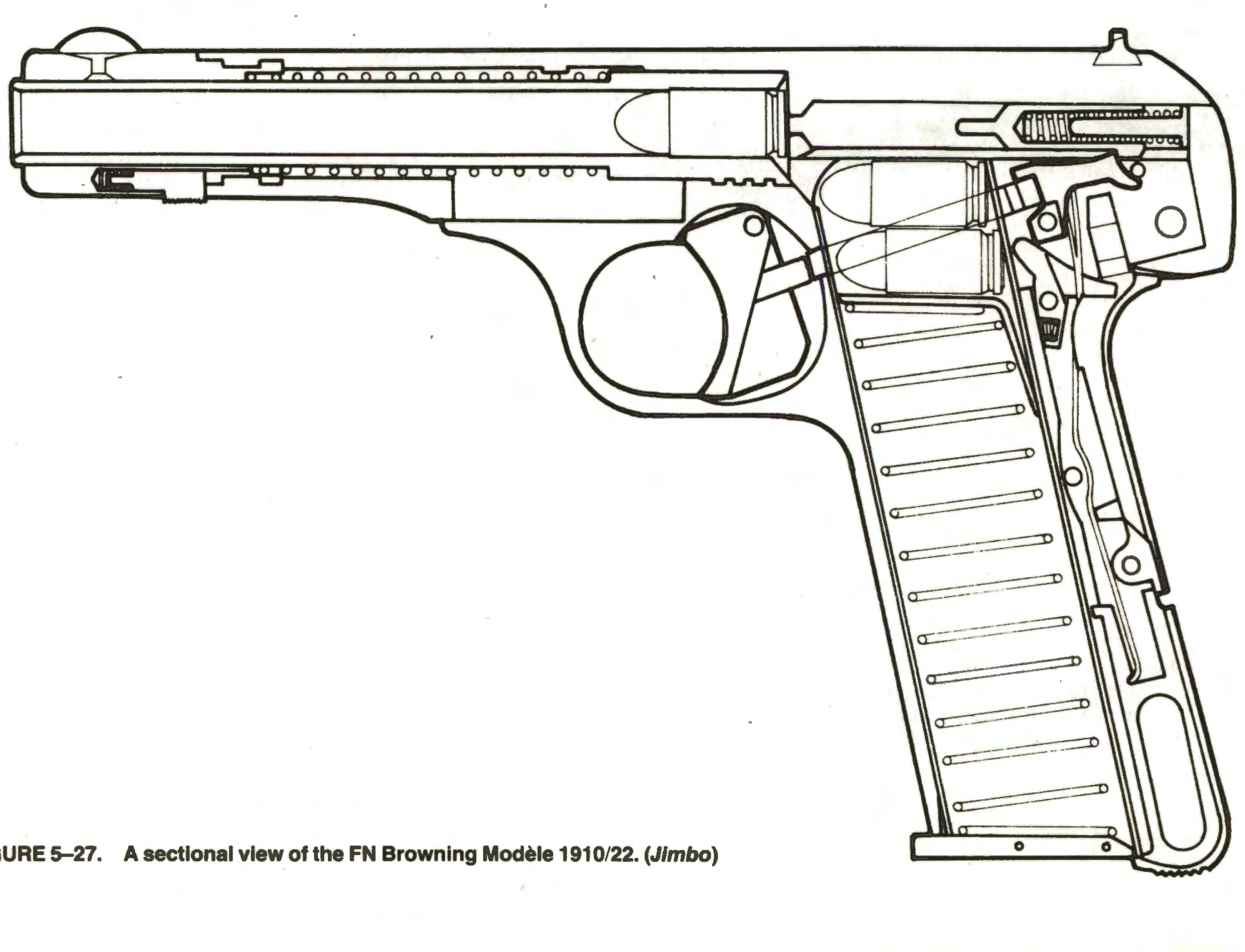
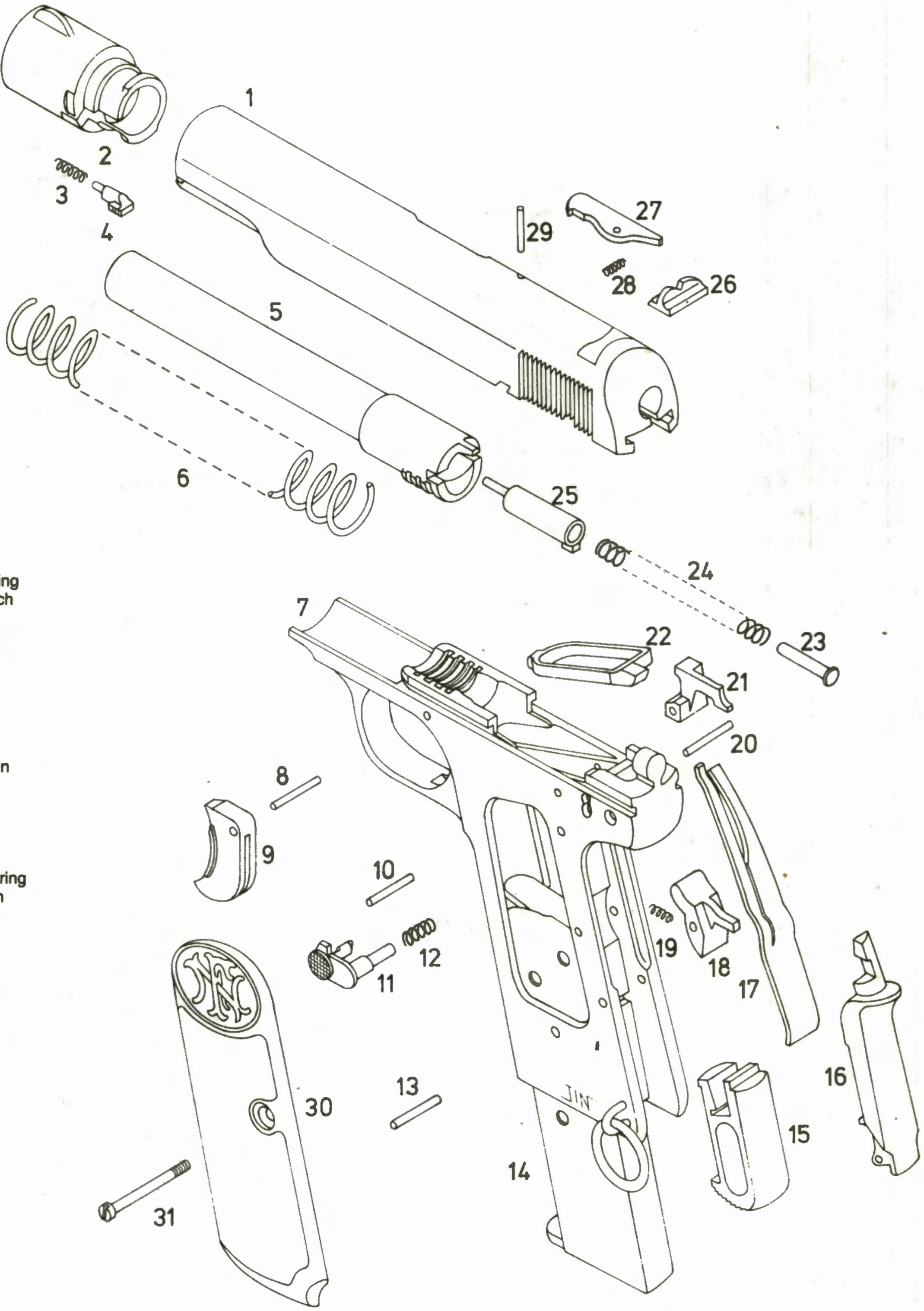


FIGURE 5–27. A sectional view of the FN Browning Modèle 1910/22. (*Jimbo*)



1. Slide
2. Slide extension
3. Slide extension spring
4. Slide extension catch
5. Barrel
6. Recoil spring
7. Frame (receiver)
8. Trigger pin
9. Trigger
10. Sear pin
11. Safety catch
12. Safety catch spring
13. Grip safety hinge pin
14. Magazine
15. Magazine catch
16. Grip safety
17. Main spring
18. Magazine safety
19. Magazine safety spring
20. Magazine safety pin
21. Sear
22. Trigger bar
23. Spring guide
24. Firing pin spring
25. Firing pin (striker)
26. Rear sight
27. Extractor
28. Extractor spring
29. Extractor pin
30. Grip plate
31. Grip plate screw

FIGURE 5–28. An exploded view of the FN Browning Modele 1910/22. (*Jimbo*)

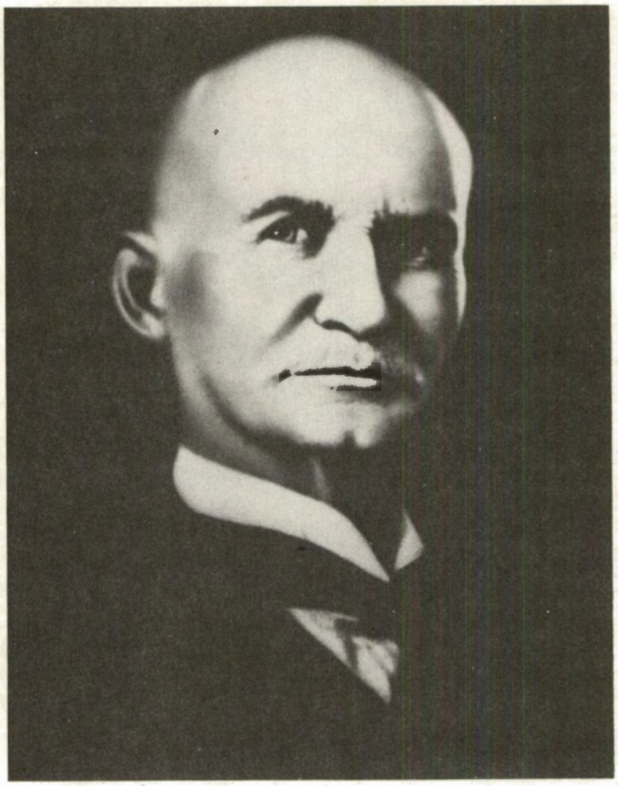


FIGURE 5–29. John Moses Browning toward the end of his career. (*U.S. Army*)

engineering phase at Inglis ran from 1943 to February 1944, when production began. After producing 151,816 of the Browning-Saive pistols, manufacture was terminated in September 1945.

There were two basic patterns of the Inglis-made 1935. The No. 1, or Chinese model, had an adjustable tangent back sight graduated from 50 to 500 meters and was intended for use with a shoulder stock-holster. The No. 2, or Canadian-British model, had a nonadjustable square-notch rear sight. Only a very small number of these were cut for shoulder stocks. After the first 1,000 pistols had been made, changes were ordered in the design of some components. These parts (extractor, ejector, and hammer assembly) were not fully interchangeable, so the original No. 1 and No. 2 pistols were designated Mark Is. The pistols with new parts were called Pistol No. I, Mk I* and Pistol No. 2, Mk I*. Each gun carried the legend "BROWNING FN 9mm INGLIS CANADA," but during the course of manufacturing four different type styles were used. A few of the early No. 1, Mk I pistols had six heavily stamped Chinese characters on the left side of the slide above the maker's name ("Chung-hua min-kuo," transliterated, which meant "property of the Chinese Republic"). Toward the end of the war, the Inglis trademark appeared inside a diamond on the right side of the frame just forward of the ejection port. Finally, there were four letter codes used in the serial numbers: CH (on No. 1 pistols for China), T (on No. 2 pistols for Canadian contract), EX (experimental and presentation pistols), and DP (drill-purpose pistols).

After World War II, Fabrique Nationale reintroduced their Modèle 1935 as the Modèle 1946 (military) or the Browning High Power (commercial). This pistol has seen extremely widespread use since the early 1950s because of the British decision to adopt and manufacture it to replace their Webley and Enfield revolvers. The following pages contain a photographic essay illustrating the evolution of this popular handgun.

IMITATION BROWNING PISTOLS

The many copies—authorized and pirated—of John M. Browning's handgun designs are a tribute to his talent as an engineer and inventor. No other designer was so blessed or cursed. Browning probably would have been flattered to see his pistol designs become the most widely imitated in the world of handguns. Although his reactions were not recorded, he was probably not pleased with the outright copies turned out while he was still alive, since they often cut into the sales of his FN and Colt pistols. Nevertheless, unauthorized copies of Browning's Modèle 1900, Modèle 1910, and the Modèle 1911 pistols make up a distinct class of Browning firearms.

Copies of the Modèle 1900

In 1955, the staff of the *American Rifleman* reported on four Modèle 1900 Browning pistols with the same serial number (126,063), three of which belonged to the late Frank Wheeler, a noted cartridge and firearms collector. The National Rifle Association also had three Modèle 1900s bearing serial number 26,063. The origins of these spurious Modèle 1900s were not clear; some were made in Asia, but others were probably produced in Europe. The quality varied significantly from one copy to another, with the fake pistols generally carrying tool marks that indicated hand filing rather than machine finishing. Serial numbers and letter markings were often unevenly stamped by hand, and some examples have been encountered with the Mauser logo instead of Fabrique Nationale's (FN). Others have improper or obviously fake proof marks. Their sights are often only crude copies of the adjustable rear sights FN put on the Modèle 1900. Barrels and grips also often show signs of being handmade.[1]

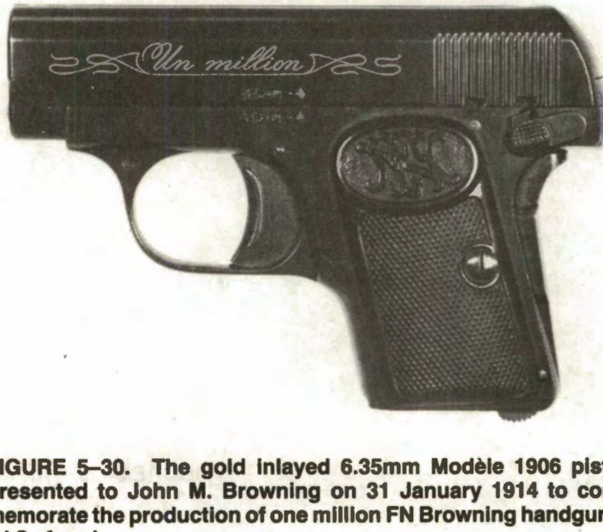


FIGURE 5–30. The gold inlayed 6.35mm Modèle 1906 pistol presented to John M. Browning on 31 January 1914 to commemorate the production of one million FN Browning handguns. (*U.S. Army*)

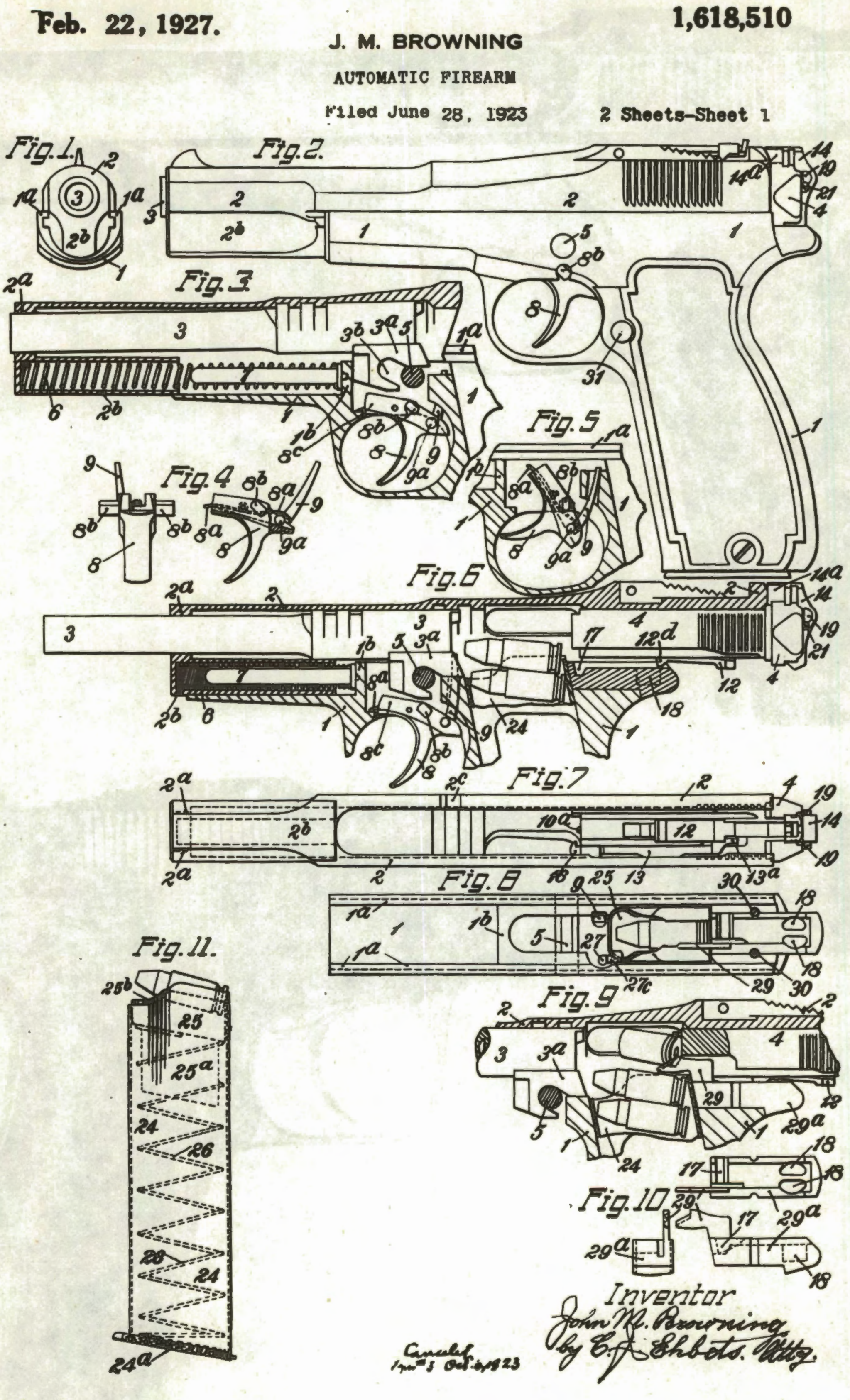


FIGURE 5–31. One of the patent drawings for the Browning pistol that led to the development of the Modèle 1935 Grand Puissance. (*U.S. Patent Office*)

FIGURE 5–32. Browning's prototype for a hammerless 9mm Parabellum pistol, ca. 1922–1923. (*Browning, U.S. Army*)

FIGURE 5–33. Dieudonne J. Salve, the man who completed the work started by Browning on the handgun that became the FN Modèle 1935 GP. *(FN)*

Why were so many copies of the Modèle 1900 made so laboriously by hand? Simply, there were just not enough FN-made pistols available in distant markets. Pathan warriors on the Northwest Frontier and Chinese soldiers wanted self-loading pistols but could not order them from Belgium. Instead, skilled handcraftsmen made pistols out of iron and steel to satisfy the local demand. This accounts for a variety of sources of Modèle 1900-type pistols. Of course, none of these pistols was as reliable as those manufactured on modern equipment under quality control guidelines. None of the copies now held by collectors should be fired because of the unknown properties of the metal used to fabricate them.

Asian copies of the Modèle 1900 represented only a limited financial loss to Fabrique Nationale and John Browning because they were made and sold in locations where it was either physically difficult to market firearms, such as the Indian Northwest Frontier, or legally difficult, such as in China. More serious for FN were the copies made of the Modèle 1903 FN Browning because they were produced in larger numbers and distributed in markets where FN normally would have attempted to sell their own handguns.

Copies of the Modèle 1903

Although exact copies of the FN Browning Modèle 1903 were relatively scarce, pistols using the basic operating mechanism of this handgun were quite common throughout Europe. The Basque gunmakers produced a variant of the Modèle 1903 that came to be known all over the world as the Eibar, or Ruby type. During the First World War, an estimated 700,000 to 1,000,000 of these pistols were made in the Basque provinces of northern Spain for the French Army (see chapter 14 for details). Spanish manufacturers did not directly deprive Fabrique Nationale of sales at this time because FN's works in Belgium had been overrun and occupied by the Germans in the fall of 1914. Indirectly, however, the production of Eibar-Ruby pistols in Spain did cause FN to lose sales in the postwar period because Spanish handgun manufacturers applied their profits from the Ruby-type pistols to the creation of a more modern domestic firearms industry. Unceta y Compañia S.A., the most important producer of the Ruby, went on to manufacture a non-Browning self-loader evolved from the work of the Comte de Campo-Giro (see chapter 14) and copies of the Mauser C96 pistol. Gabolondo y Compañia, another wartime manufacturer of Ruby-type pistols, subsequently built the Llama series of handguns based on the Colt Browning Modèle 1911. And Bonifacio Echeverria shifted production in the postwar years from its own hybrid design to a close copy of the Modèle 1911.

Copies of the Modèle 1906

This 6.35mm (.35 ACP) pocket model pistol was also a very popular handgun among the gunmakers of the Eibar region. Thousands were produced annually from 1906 through World War II.

Copies of the Modèle 1910

This FN Browning pistol varied considerably from the 1903 and 1906 models in that its recoil spring was fitted coaxially around the barrel instead of being mounted below the barrel. The spring was held in place by a special barrel bushing. Several Spanish manufacturers began making the Modèle 1910 because it was a better handgun and more modern-looking than the Modèle 1903 Eibar-types. Several other European manufacturers made copies as well because of the design's attractiveness and market appeal. The sales of Modèle 1910 copies cut into FN's profits, so they took steps to limit the marketing of these copies. So widespread was the distribution of Browning designs and copies that by the mid-1920s the word "Browning" was almost universally used as a synonym for any 6.35mm or 7.65mm self-loading pistol.

Table 5–2 lists some of the manufacturers that built copies of the FN Browning Modèle 1903, the Modèle 1906 6.35mm pocket pistol, or the Modèle 1910. As is readily apparent from this listing, the Spanish manufacturers copied the Browning blowback self-loaders most widely. Few of these concerns continued production of their Browning-type pistols beyond 1939, however. The most notable exception was the French Manufacture d'Armes de Pyrénées, located across the Pyrenees mountains from the Eibar region of Spain (see chapter 10).

Copies of the Model 1911 Colt Browning

Most exact copies of the Model 1911 pistol were built under licenses acquired from the Colt Patent Fire Arms Manufacturing Company. Norway was the second country to adopt the Model 1911 and the second to license its manufacture. Because of the Colt-Fabrique Nationale (FN) distribution agreement regarding Browning pistols, the Norwegians negotiated with Colt through FN. Production rights for an open-ended quantity of pistols cost the Norwegian government 25,000 kroner. Before production was started at the Kongsberg Våpenfabrikk, Norway procured 300 Model 1911 pistols from Colt.

TABLE 5-2 FN BROWNING COPIES

Trade Name (Manufacturer)	Location	Design(s) Copied
AAA Manufactura de Armas (A. Aldazabal)	Elbar	Modèle 1903 Modèle 1906
Action No. 2 (also Corrientes and M.S.) (Modesto Santos)*	Elbar	Modèle 1903 Modèle 1906
Alkar (Alkarstuna)	Guernica	
Allies (Fcá de Berasaluce Areitic Autenay Cia)	Elbar	Modèle 1903 Modèle 1906
American Automatic Pistol (unknown)	Spain	Modèle 1903
Anitua (also Sprinter and Tigre) (Garate, Anitua y Cia)	Elbar	Modèle 1903 Modèle 1906
ARD (unknown)	Spain	Modèle 1903
Arizaga (also Pinkerton) (Gaspar Arizaga)	Elbar	Modèle 1903
Arrizabalaga (also Terrible, Campeon, Especial, Republic (?)) (Hijos de Calixto Arrizabalaga)	Elbar	Modèle 1903
Astra (also Fortuna, Vicotria, Leston, Liegeoise, Museum, Salso, Unceta) (Unceta y Compañia)	Elbar	Modèle 1906
Atlas (Domingo Acha y Compañia or Fabrica de Acha Hermanos)	Vizcaya	Modèle 1906 (6.35mm and 7.65mm)
Azanza y Arrizabalaga (also A.A., Reims) (Azanza y Arrizabalaga)	Elbar	Modèle 1903 Modèle 1906
Azipiri (also Avion, Colon) (Azipiri y Cia or Antoñio Azipiri)	Elbar	Modèle 1906
Azul (also Looking Glass) (Eulogio Arostegui)	Elbar	Modèle 1903
Basculant (also Le Dragon) (Aguirre y Cia)	Elbar	Modèle 1906
La Basque (also Selecta, Boltun, E.A., Protector, Renard) (Echave y Arizmendi)	Elbar	Modèle 1906
Bernedo (Vincenzo Bernedo y Cia)	Elbar	Modèle 1903
Bolumburu (also Bristol, Giralda, Gloria, Marina, Regent, Regina, Rex) (Gregorio Bolumburu)	Elbar	Modèle 1903 Modèle 1906
Bufalo (sic) (also Danton, Perfect, Plus Ultra, Ruby) (Gabilondo y Cia)	Guernica, later Victoria	Modèle 1903 Modèle 1906
Burgham Superior (unknown)	Spain	Modèle 1906
Cebra (Arizmendi, Zulaica y Cia)	Elbar	Modèle 1903
Chantecler† (Manufacture d'Armes de Pyrénées)	Hendaye, France	Modèle 1903
Colonial (also Jupiter, Minerve (sic), Trust, Trust Supra) (Fabrique d'Armes de Guerre de Grand Précision)	Elbar	Modèle 1903 Modèle 1906
Continental (also Celta, Express, Imperial, Le Secours, Phoenix, Premier, Pinceps, Puma, Union, Venus) (Tomas de Urizar y Cia)	Elbar	Modèle 1903
Crucero (also Salvaje) (Ojanguren y Vidosa)	Elbar	Modèle 1903
D. W. M. Modell 1923 (Deutsche Waffen-und Munitionsfabriken)	Berlin	Modèle 1910
Demon (unknown)	Spain	Modèle 1903
Destroyer (also Indian, Surete) (Isidro Gaztanaga)	Elbar	Modèle 1903 Modèle 1906
Destructor (also Salaverria) (Iraola Salaverria y Cia)	Elbar	Modèle 1903
Diana (unknown)	Elbar	Modèle 1903
Dicator (Société Anonyme des Fabriques d'Armes Réunies)	Liège	Modèle 1906
Douglas (Lasagabaster Hermanos)	Elbar	Modèle 1906
Duo (also Ideal, Jaga, Singer) (Frantisek Dusek)	Opocno, Czechoslovakia	Modèle 1906
Durabel (sic) (L. & J. Wornant Frères)	Hognee, Belgium	Modèle 1906
E. A. (also Selecta, Vite) (Echave y Arizmendi)	Elbar	Modèle 1906
Echeverria (also Kiesesewski, Vesta) (Bonifacio Echeverria)	Elbar	Modèle 1906
El Cid (also Vencedor) (C. Santos)	Elbar	Modèle 1903
Eles (unknown)	Spain	Modèle 1903
Eley (unknown)	Spain	Modèle 1903
El Perro (Lascuraren y Olasola)	Elbar	Modèle 1903
Errasti (Antonio Errasti)	Elbar	Modèle 1903
Etai (unknown)	Spain	Modèle 1903
Etna (also Invicta, Iraola, Protector, Tisan, Unis) (S. Salaberrin)	Ermua, Spain	Modèle 1903
Favorit (unknown)	Spain	Modèle 1903
Fiel (also Marte) (Erquiaga y Cia)	Elbar	Modèle 1903

Trade Name (Manufacturer)	*Location*	*Design(s) Copied*
F.M.E. (Fabrica Material de Guerra)	Santiago	Modèle 1906
Galesi (Industria Armi Galesi)	Brescia	Modèle 1906 Modèle 1910
Gallus (also Liberty, Military, Paramount, Stosel, Titan, Titanic) (Retrolaza Hermanos)	Eibar	Modèle 1903 Modèle 1906
Gecado (also S.E.A.M., Silesia) (Fabrica d'Armes de Sociedade Español de Armas y Municiones)‡	Eibar	Modèle 1906
Guerre (also Kaba Special, Roland, Singer, Sivispacem, Teuf-Teuf, Victor, Walman, Ydeal) (Francisco Arizmendi)	Eibar	Modèle 1903
H.V. (Hourat et Cie)	Paris	Modèle 1906
Imperial (J. Aldazabal)	Eibar	Modèle 1903
Joha (unknown)	Spain (?)	Modèle 1906
Kapporal (unknown)	Spain	Modèle 1903
Kebler (unknown)	Spain	Modèle 1903
La Industrial (Orbea Hermanos)	Eibar	Modèle 1903 Modèle 1906
L.E. (Larranaga y Elartza)	Eibar	Modèle 1903 Modèle 1906
Libia (Beistegui Hermanos)§	Eibar	Modèle 1903
Longines (Cooperative Obrera)	Eibar	Modèle 1910
Lusitania (unknown)	Spain	Modèle 1903
Lutetia (unknown)	Spain	Modèle 1906
MAB Modèle 4 (Manufacture d'Armes de Bayonne)	Bayonne, France	Modèle 1906
MAB Modèle C and D (Manufacture d'Armes de Bayonne)	Bayonne, France	Modèle 1910
Mann (Fritz Mann Werkzeugfabrik)	Suhl, Germany	Modèle 1906 Modèle 1910
Mars (Kohout & Spolecnost)	Kdyne, Czechoslovakia	Modèle 1910
Martian (also Le Maritan, Thunder) (Martin A. Bascaran)	Eibar	Modèle 1903 Modèle 1906
Le Metore (unknown)	Spain	Modèle 1906
Merke (F. Ormachea)	Ermua, Spain	Modèle 1903
Maxi (unknown)	Spain	Modèle 1903

Trade Name (Manufacturer)	*Location*	*Design(s) Copied*
Nordheim (G. von Nordheim)	Germany	Modèle 1910
Omega (Armero Especialistas Reunidas)	Eibar	Modèle 1903
Oyez (unknown)	Eibar	Modèle 1903
Paramount (also Triomph (sic) (Apaolozo Hermanos)	Zumorraga, Spain	Modèle 1903
Peugot (unknown)	France	Modèle 1906
PZK (Kohout & Spolecnost)	Kdyne, Czechoslovakia	Modèle 1906
Rayon (unknown)	Spain	Modèle 1903
Reform (unknown)	Spain	Modèle 1903
Rival (Union Fabrica d'Armas)	Eibar	Modèle 1903
Roland (Arizmendi)	Eibar	Modèle 1903
Royal (also Victory, Vinvitor) (M. Zulaica y Cia)	Eibar	Modèle 1903
S.A. (Soc. d'Armes Française)	Paris	Modèle 1906
Slovia (Antonín Vilímec)	Czechoslovakia	Modèle 1906
S.M. (unknown)	Spain	Modèle 1906
Tatra (unknown)	Spain	Modèle 1903
Tiwa (unknown)	Spain	Modèle 1903
Torpille (unknown)	Spain	Modèle 1903
U.A.E. (Union Armera)	Eibar	Modèle 1906
U.C. (also Urrejola) (Urrejola y Cia)	Eibar	Modèle 1903
Union (Seytres)	Saint-Étienne, France	Modèle 1903
Unique‖ (Manufacture d'Armes de Pyrénées)	Hendaye	Modèle 1903
Vaninquer (A. Mendiola)	Ermua	Modèle 1906
Vilar (unknown)	Spain	Modèle 1903
Vulcain (sic) (unknown)	Spain	Modèle 1906
Zwylacka (unknown)	Spain	Modèle 1906

*Sold to the French Army through Les Ouvriers Réunis.
†One of the many trade names used by this firm for their Unique model. See the discussion of the French handgun in chapter 10.
‡S.E.A.M. built for G. C. Dornheim, AG of Suhl.
§Sold by Grande Précision.
‖Nearly 30 other trade names were used for this basic pistol. See the discussion in chapter 10.

On 14 April 1915, the Norwegian Ministry of Defense standardized the Model 1911-type pistol as the "Colt Automatisk Pistol Model 1912." Component fabrication began in July 1917, and the first completed pistol was delivered on 3 December. This initial lot, consisting of 500 pieces, was delivered between December 1917 and June 1919. These first Norwegian-made pistols were virtually identical to Colt Model 1911s, except for the property markings and the hammers' checkering pattern. Several minor changes were incorporated in the second model, the "11.25mm Automatisk Pistol Model 1914." The most interesting of these changes involved enlarging the slide locking lever to make it easier to operate. Between 1919 and 1922, a series of small production runs were completed, totaling about 2,500 pistols. In 1923, production reached 3,000, and in 1928, the largest single lot—4,240—was completed. Between 1919 and 1940, 21,941 Model 1914 pistols were made in Norway.

With war threatening Europe in the late 1930s, the Kongsberg Våpenfabrikk took steps toward renewing the production of their Model 1914, but no pistols were completed prior to the German occupation of Norway. About 10,000 pistols were built for the Heereswaffenamt during the war, designated "Pistole 657(n)—Norw. 14—." The reported grand total for Kongsberg-made Model 1912 and Model 1914 pistols is 32,854.[2]

The second major licensed production outside the United States took place in Argentina. Prior to manufacturing the Model 1911, the Argentine army purchased it as the *Pistolà Automatica Sistema Colt, Calibre 11,25mm, Modelo 1916.*. Delivery of these pistols was interrupted by the First World War, but after the war, starting in early 1920, Colt renewed regular deliveries. When the Model 1911A1 replaced the Model 1911, the Argentine army changed the nomenclature of their pistol to *Pistola Automatica Sistema Colt, Calibre 11,25mm, Modelo 1927*. By the early 1930s, the Argentine demand for pistols was such that it exceeded Colt's ability to deliver, so a licensing agreement was written giving the Argentine arsenal at Rosario, the Fabrica Militar de Armas Portatiles "Domingo Matheu" (FMAP), permission to fabricate the Model 1911A1. Accurate data concerning the number of pistols purchased from Colt and the number manufactured at FMAP are not available.

These licensed-production Modelo 1927 pistols should not be confused with the unauthorized Ballester-Rigand or Ballester-Molina copies of the Model 1911A1 built by Hispano Argentina de Automovites, S.A. (HAFDASA) of Buenos Aires. Some Ballester-Molina pistols have been found with "Policia Federal" markings, but very little is known about the history of these handguns. An unknown number of Ballester-Molina pistols was purchased by the British during World War II, most of which were issued to Special Operations Executives[7] (SOE) agents for clandestine activities.[3]

The Mexican military adopted the Model 1911 pistol shortly after the First World War, but all of their pistols were manufactured by Colt in America. After the switch to the Model 1911A1 in 1925, Colt supplied this new model to the Mexican army. A quantity of Model 1911A1s marked "Ejercito Mexicano" delivered on 22 March 1926 represented the very first commercial production of this pistol.

In the early 1930s, the Mexican government encouraged—if it did not actually support—the development of an 11.43mm (.45 caliber) pistol by Alejandro Obregon, a design about which very little is known. A Mexican patent for the Obregon was issued on 5 July 1934 (no. 35,053), followed by an American patent (no. 115,041) on 26 April 1938. An unknown number (about 800 to 1,000) was produced at the Fabrica Nacional de Armas Mexico in Mexico City from about 1934 to 1938.

Externally, the Obregon pistol was very similar to the Model 1911A1, except for the more cylindrical profile of the slide. Internally, however, it was significantly different. The pistol locking mechanism was based on a rotating bolt similar to the Steyr-Hahn or the Czech vz.24. A helical camming lug was machined onto the exterior surface of the barrel below the cartridge chamber. This lug rode in a locking piece that was fastened to the frame by the combination slide-stop and safety catch bar. Upon firing, barrel and slide recoiled together. The barrel cam caused the barrel to rotate about 17 degrees before it unlocked from the slide. The Obregon magazine also differed slightly from the standard Model 1911 magazine, and some models had a magazine disconnector that locked the hammer when the magazine was removed.[4]

Other pistols that evolved from the Model 1911 Colt Browning include the Star handguns made by Bonifacia Echeverria in Eibar, the Llama handguns made by Gabilondo in Elgobar, the Soviet Tula-Tokarev-30, the French Modèle 1935S and 1935A pistols, the FN Browning Modèle 1935 Grande Puissance, and the SIG P210 (SP 47/8) pistol.[5]

Another Colt Browning Model 1911-inspired pistol worth noting here is the Polish "Pistolet wojskowy wzor Vis 1935," better known as the Radom or the Vis. The story of the Polish Parabellum Vis self-loading pistol has been told by one of its developers, Piotr Wilniewczyc, who began his employment at the National Armaments Factory (Państwowej Wytwórni Uzbrojenia, or PWU) at Warsaw in mid-1928.[6] One day in the winter of 1929 Andrzej Dowkontt, technical director of the PWU, showed Wilniewczyc a letter from the Polish Department of Armaments (Departmentu Uzbrojenia) advising the staff of the Armaments Factory that the government planned to purchase the license to manufacture the Czech 9mm Browning vz.24 pistol from the Česká Zbrojovka in Prague for 1,300,000 zloty (about $250,000). Wilniewczyc was upset at this news because he believed the Czech pistol to be underpowered and too fragile for military use. After pointing out the vz.24's weak points, he proposed to Dowkontt that the National Armaments Factory undertake the development of a self-loading pistol that would not require any payment to foreign manufacturers. Having already studied the pistols available on the international market, Wilniewczyc thought that he could prepare a design on paper in six to eight weeks. Dowkontt gave him two months to complete the design work

TABLE 5-3 NORWEGIAN MODEL 1911-TYPE PISTOLS

Model	*Date of Production*	*Factory*	*Quantity*
M1911	**1913**	**Colt**	**300**
M1912	**1917–19**	**Kongsberg**	**500**
M1914	**1919–40**	**Kongsberg**	**21,941**
Pistole 657(n) (M1914)	**1940–44(?)**	**Kongsberg**	**ca 10,000**
M1914	**1945–**	**Kongsberg**	**ca 400**

and two months to fabricate a firing prototype–contingent on his success at convincing the Department of Armaments to delay the contract with the Czechs.

Wilniewczyc was silent a moment before saying, "The day after tomorrow, I can prepare a drawing of the pistol assembly, a fairly effective and adequate set of specifications. Let us add this data to the letter for the Armament Department; let's say that we have been working on a pistol for a long time, that we will bear the cost, and request them to delay the signing of the contract until we have submitted our model for the purpose of conducting comparison tests." While neither man thought their scheme would succeed, they decided to try. It took Wilniewczyc two days to put together a preliminary drawing and the technical specifications for the new weapon, the so-called *Pistolet wojskowy wzor PWU 1928* (the Military Pistol Model PWU 1928). Blueprints of the drawing and specifications were sent to the experts at Armaments as soon as possible. While awaiting a reply, Wilniewczyc began working on his pistol in earnest.

During this early stage of the design effort, Wilniewczyc was visited by Jan Skrzypinski, director of the Machine Gun Factory in Warsaw and a trained mechanical engineer. Upon seeing Wilniewczyc's drawings, Skrzypinski offered to help with the undertaking, and the men quickly agreed to a partnership. A short time later, they were told that the Department of Armaments would postpone any decision about the licensing agreement for 90 days. Three months was not long enough for the designers, because both men had had to travel outside the country during that time to perform their regular duties at their factories. However, this did not prove to be a major problem because others within the Polish defense community were calling for a further study of the handgun issue. Most were opposed to the introduction of any self-loading pistol, preferring instead an improved revolver to replace the aging Nagants then in service. Undaunted, Wilniewczyc and Skrzypinski continued their work.

In the fall of 1930, the two men were able to devote a substantial amount of their time to the creation of a self-loader. They had decided to use the 9mm Parabellum cartridge and an improved Colt Browning Model 1911-type mechanism. Wilniewczyc explained how he came to choose the Model 1911 mechanism: "It would not have been a wise thing, of course, to initiate a design without considering existing products. It was, rather, a matter of selecting the most successful and modern weapon model and, based on it, to try to create the perfect weapon. The most successful of those previously designed were . . . the [FN Browning] Model 1903 . . . and the [Colt Browning] Model 1911 . . .—both models created by John Browning, the most talented of builders in the world in the field of automatic weapons." Equally important was the fact that "both designs were at that time free for production because of the expiration of the patents."

The Model 1903 "had an immovable barrel while firing and an unlocked breech, the [Model 1911 had] a movable barrel and a locked breech. Both models were similar from the point of view of the arrangement of the main components and external appearance. The 1903 model did not have an external hammer." The officers of the Polish Army generally did not favor unlocked breech pistols—blowback designs—because they were supposedly less safe. "In this instance, it did not pay to spend time on trying to convince them that in actuality this was not so." Therefore, "the design was finally based on the Colt Browning pistol, Model 1911."

Wilniewczyc started work where Browning left off. "I retained the general Browning set-up. On the other hand, I introduced changes in a variety of details. Retaining the principle of locking, locking lugs on the upper surface of the barrel, I simplified their design. I discarded the movable locking link which connected the barrel to the frame. I obtained control of the barrel by appropriate shaping of its lower surface where the link had been." The result was a cammed locking movement quite similar to that used on the Browning-Saive Modèle 1935. These changes also reduced the time and cost required to manufacture the Polish pistol. Wilniewczyc also modified the ejector, eliminated the external manual safety, and added a recoil spring guide rod to the spring assembly beneath the barrel.

On the subject of mechanical safeties, Wilniewczyc had some strong opinions: "such a safety was the ultimate evil, if it involved a hammerless pistol. In pistols . . . with an external hammer it is not only a luxury, but also dangerous." He and Skrzypinski relied instead on the grip safety and on carrying the hammer down. "I am glad that our pistol is one of the few which cannot be put on safety with a mechanical safety device." Still, the absence of this feature caused complaints from the military.

Under the direction of Leon Nastula, M. Olszánski, Feliks Modzelewski, and others at the Machine Gun Factory, the first prototype was completed in February 1931. Skrzypinski suggested that the pistol be named the "W and S," using the first letters of their family names, but the Department of Armaments changed "Wis" to "Vis," which means force in Latin. Next the pistol was subjected to firing tests at the range in Zielonka, near Warsaw. During a 6,000-round series, the pistol failed only one test. A corporal who was performing some of the tests was instructed to immerse the pistol in water and then to put it into a box filled with a special sand. By mistake, he placed the wet gun into a bin of dry cement. After some red faces and much cleaning, the testers successfully fired the pistol again, completing the 6,000 rounds. Only one problem was encountered that required a design change. The pistol had fired during drop tests, so the sear mechanism was altered to prevent the gun from discharging accidentally.

On 16 March 1933, the Department of Armaments bought the Wilniewczyc and Skrzypinski patent (no. 15,567, 8 February 1932) from the designers for 50,000 zloty ($9,650). The handgun was then submitted to limited troop trials. Two changes were made at the request of officers who participated in these demonstrations. First, the rear of the frame was modified to remove sharp edges that might cut the shooter's hand. And second, the designers added a hammer release lever that allowed the hammer to be dropped and the pistol safely holstered using just the firing hand. When the release was pressed, the firing pin was retracted into its housing so that the hammer could not strike it. Then the sear was tripped and the hammer fell. The pistol could be safely carried with a loaded chamber. When the hammer was cocked manually (this was a single-action pistol), the release catch was reset and the firing pin released. The Vis was the first pistol equipped with this kind of hammer release device.

Production of the "Vis Pistolet wojskowy wzor 1935" was

carried out at the Fabryka Broni (Weapons Factory) near the Polish city of Radom, about 50 kilometers south of Warsaw. According to Wilniewczyc, approximately 18,000 Vis pistols were manufactured between 1935 and 7 September 1939 when the German army overran Radom. During the years of German occupation, the Polish factory was operated under the supervision of Austrian managers brought from Steyr-Daimler-Puch, who saw some 310,000 Vis pistols built before the advance of the Red Army in 1944 prompted the Germans to abandon the factory. An unknown number of Vis pistols manufactured at Radom were smuggled out of the works to Polish partisans who maintained an underground resistance.

The Polish government paid 117 zloty ($22.58) each for the first lots of Vis pistols in 1935 and 1936, but by 1939 the price had been reduced to 84 zloty ($16.21). These prices included the production cost and a profit for the factory. No record of the cost of these pistols during the war years has been found.

The first 3,000 Vis pistols made for the Polish Army had alloy steel slides and frames. Polish army pistols and some German period pieces had the back strap of the frame cut for a shoulder stock. Polish army and early German production models had blued finishes and molded plastic grips with the monogram "FB" on the left grip and "VIS" on the right. As the war progressed, the Austrian technicians took steps to speed production. First, the stock slot disappeared; then the hammer release mechanism was eliminated. Wood grips appeared in 1943, as did the dull grey-green phosphate-type surface finish. At about this time, solid pins (for the hammer, sear, and grip safety) were dropped in favor of cross pins rolled from sheet metal. Slide markings on the left side of prewar production Vis pistols include the name of the factory (F. B. Radom), a date, the Polish eagle crest, the designation "VIS—wz 35," and the patent number (15,567). Occupation period pistols bear the factory name, the designation "VIS MOD. 35," and the patent number. Some German period Vis pistols have the German Fremdengerat number "P35(p)" stamped below the one-line slide marking. Waffenamt-inspector marks "WaA77" and the Wehrmacht eagle over the number "823" are found stamped on the barrel, lug, slide, and frame. Some crudely made pistols with the code mark "bnz" and the Wehrmacht eagle over the number "623" are believed to have been assembled at the Steyr factory in Austria in the closing days of the war. As Hogg and Weeks note: "the Fabryka Broni Radomu was one of the very few factories occupied by the Germans that was not given a production code number. Instead, it continued to operate under its own name throughout the war."

NOTES

This chapter was based largely on the following sources:

Browning, John and Gentry, Curt. *John M. Browning, American Gunmaker: An Illustrated Biography of the Man and His Guns.* Garden City, NY: Doubleday & Co., Inc., 1964.

Fabrique Nationale. *FN, 1889–1964* [a company history]. Liège: FN, 1964. pp. 59–91, 105–09, 159–77.

Stevens, R. Blake. *The Inglis-Browning Hi-Power Pistol.* Ottawa: Museum Restoration Service, 1974.

Walter, John. "Fabrique Nationale's Blowback Pistols: Part I—The Military Models, 1899–1945." *Shooter's Bible* (South Hackensack, NJ: Stoeger Publishing Co.), 1979. pp. 63–68.

Walter. "Fabrique Nationale's Blowback Pistols: Part II—The Military Models, 1899–1945." *Shooter's Bible* (South Hackensack, NJ: Stoeger Publishing Co.), 1980: pp. 100–110.

1 NRA Technical Staff, "Watch Those Numbers!" *American Rifleman* (December 1955): 36–37.

2 Donald B. Bady, *Colt Automatic Pistol,* rev. and enlarged ed. (Alhambra, CA: Borden Publishing Co., 1973), pp. 216–20.

3 Ibid., pp. 265–68.

4 Richard Brezner, "The Obregon .45: Rare & Mysterious Pistol," *American Rifleman* (May 1978): 32–34.

5 Donald M. Simmons, Jr., "Recoil Operated Handguns by Browning," *American Rifleman* (June 1975): 24–25.

6 Piotr Wilniewczyc, "Vis i Mors," *Muscalnictwo wojskowe* (Military museum management) 21 (1978): 317–33. *See also* Gene Lovitz, "The Valiant Vis," *Guns* (April 1969): 18–20, 68–70.

FIGURE 5–34. The first model of the 9mm striker-fired Browning pistol as fabricated at FN, ca. 1923. (*Browning, U.S. Army*)

FIGURE 5–35. Last of the striker-fired 9mm Parabellum Browning pistol prototypes built at FN, ca. 1923–1924. (*U.S. Army FN*)

FIGURE 5–36. The first of the hammer-fired 9mm Parabellum Browning-Saive pistols built at FN, ca. December 1924. (*FN*)

FIGURE 5–37. A March 1926 Browning-Saive prototype. (*FN*)

FIGURE 5–38. Browning-Saive prototype number 108. Note the safety lever below the hammer. (*FN*)

FIGURE 5–39. A November 1928 prototype of the Browning-Saive pistol that is very close to the Modèle 1935 pattern. Note the safety lever, take-down lever, slide profile, and modified hammer. (*FN*)

FIGURE 5–40. These prototypes were built in, *from top to bottom;* March 1929, March 1929, May 1930, and July 1931. (*FN*)

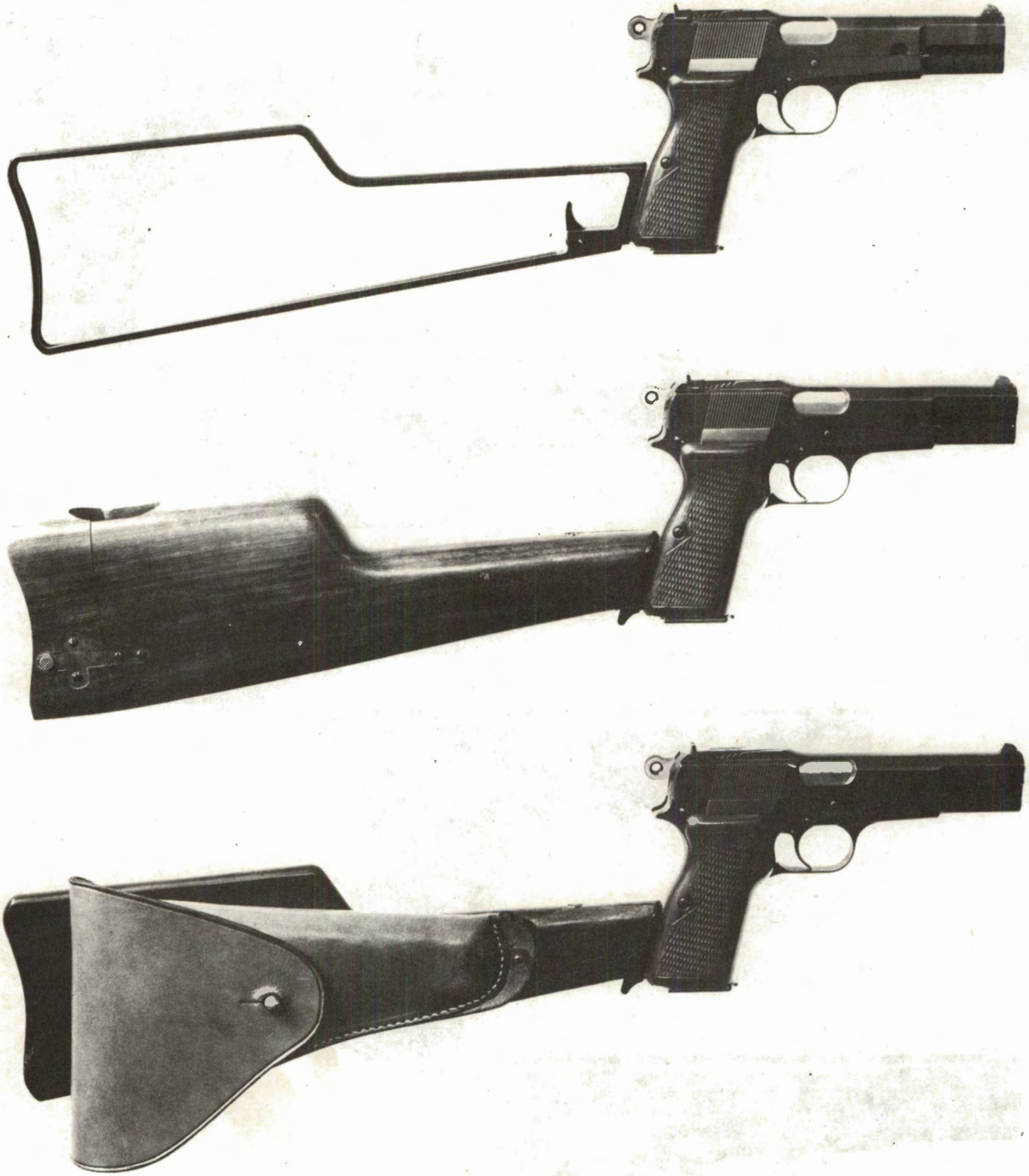
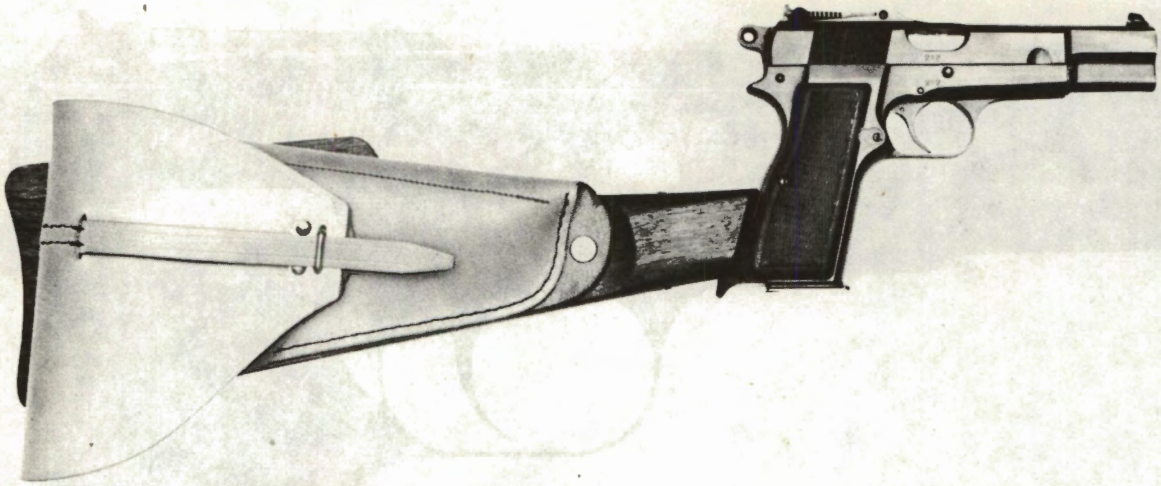
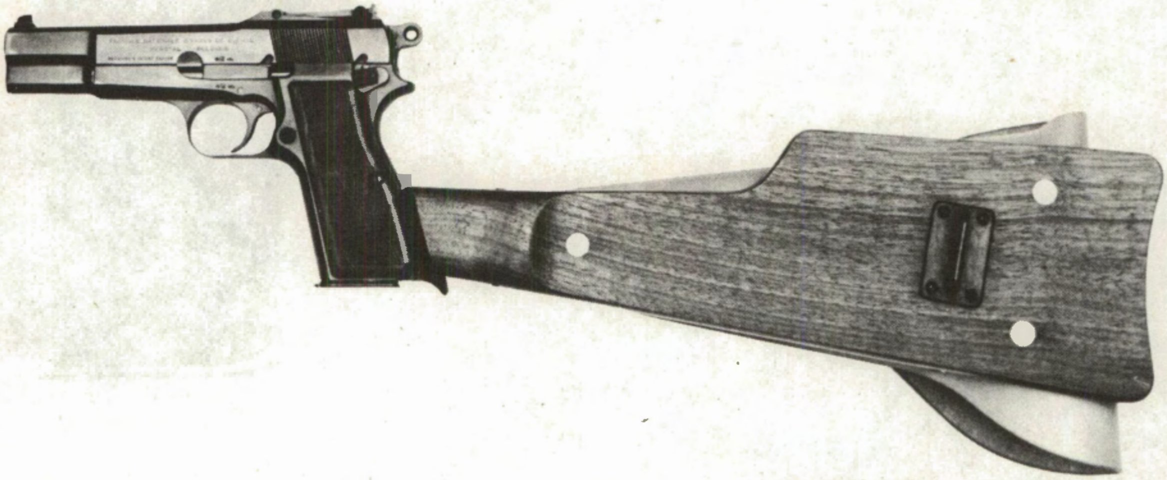
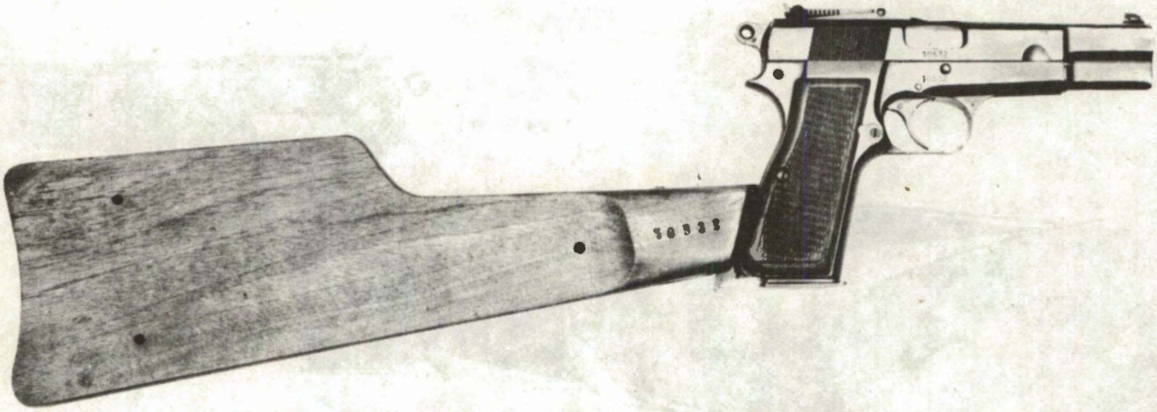


FIGURE 5–41. Three experimental-stocked versions of the 9mm Parabellum Browning-Saive pistol, dating from October 1931. Note the adjustable tangent rear sight. (*FN*)

FIGURE 5–42. The first production version of the 9mm Parabellum FN Modèle 1935 GP pistol, November 1934. It measured 197 millimeters in length, with a 118-millimeter barrel (rifling/twist, 6/R). Recoil operated, it weighed 900 grams and used a 13-shot box magazine. (*FN*)







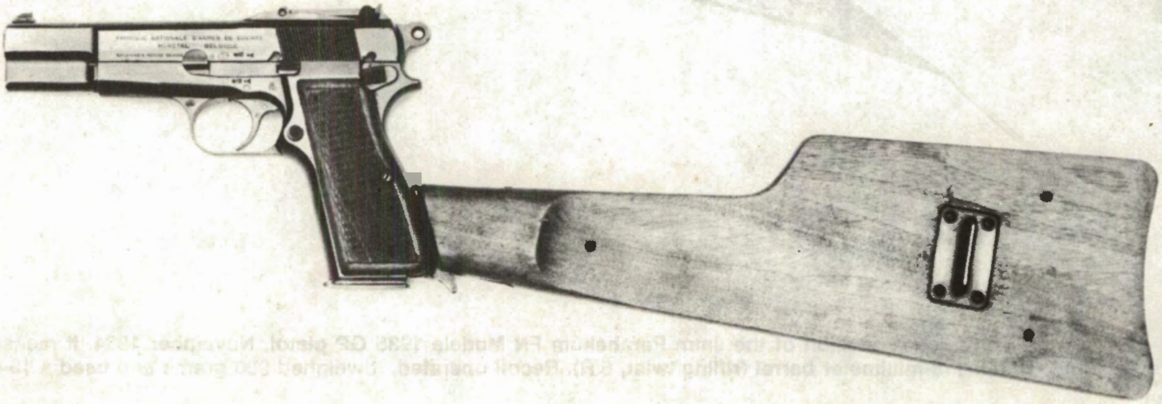


FIGURE 5–44. An FN Modèle 1935 GP pistol made during World War II during the German occupation. Note the rough finish on this pistol. (*Tokoi*)

←

FIGURE 5–43. Two variants of the FN-made Browning-Saive Modèle 1935 pistol stock. The top pistol (serial number 282) is shown with a leather holster attached. The gun in the bottom photo (serial number 10,352) has the same kind of stock as the top view. (*Visser*)

FIGURE 5–45. Three versions of the stocked Inglis-made Modèle 1935 GP pistol. The *top* two views show early No. 1, Mk I pistols. *Below* are two views of the No. 1, Mk I* (serial number 1CH5080). (*Krcma, top; Visser, bottom*)

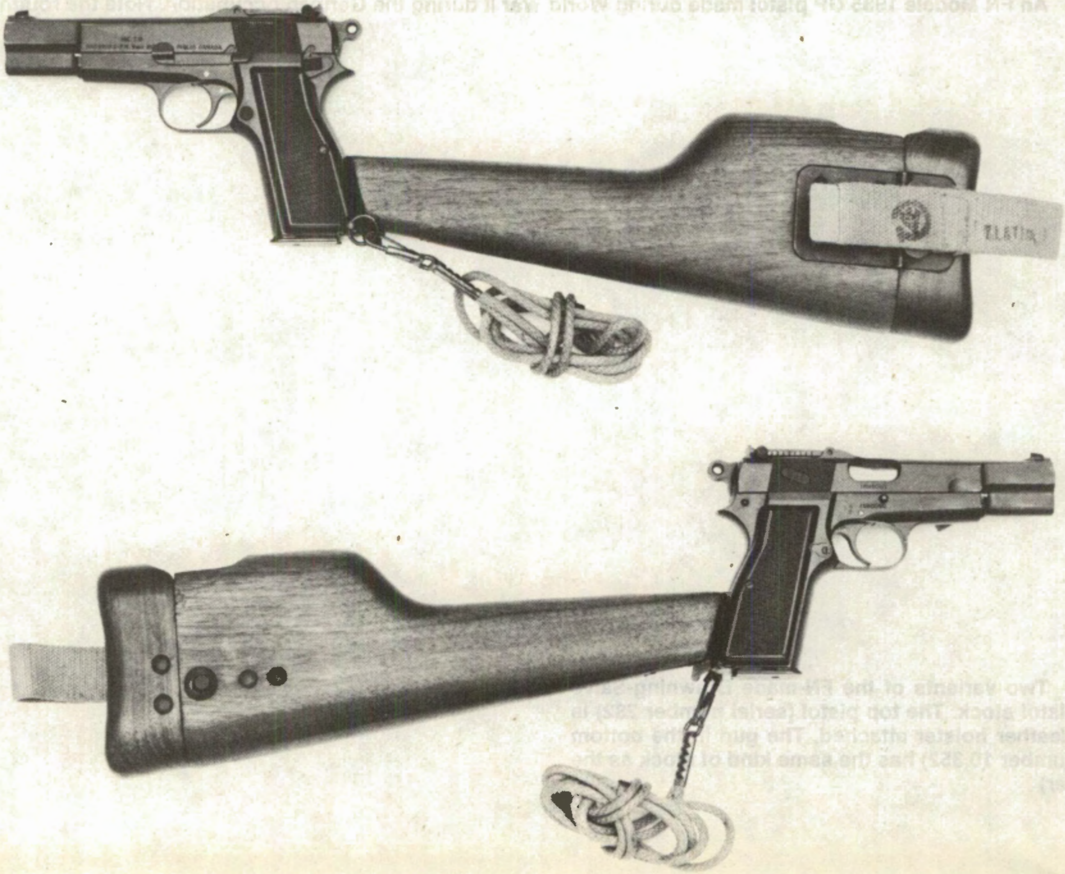


FIGURE 5–46. A comparison of (*top*) the No. 1, Mk I Inglis-Browning pistol made for China and (*bottom*) the No. 2, Mk I* made for Canadian and British troops. (*Krcma*)

FIGURE 5–47. Four Inglis-made Browning-Saive Modèle 1935 pistols, *from top to bottom:* serial number OT2959; 9T3620; EX23 (gold-plated); and XP-76-7 (lightweight experimental model). (*Nonte, Krcma*)

FIGURE 5–48. Two views of an Inglis-made cutaway training or drill-purpose model of the Modèle 1935 GP. Note the serial number DP201 on the right side of the frame. (*Krcma*)

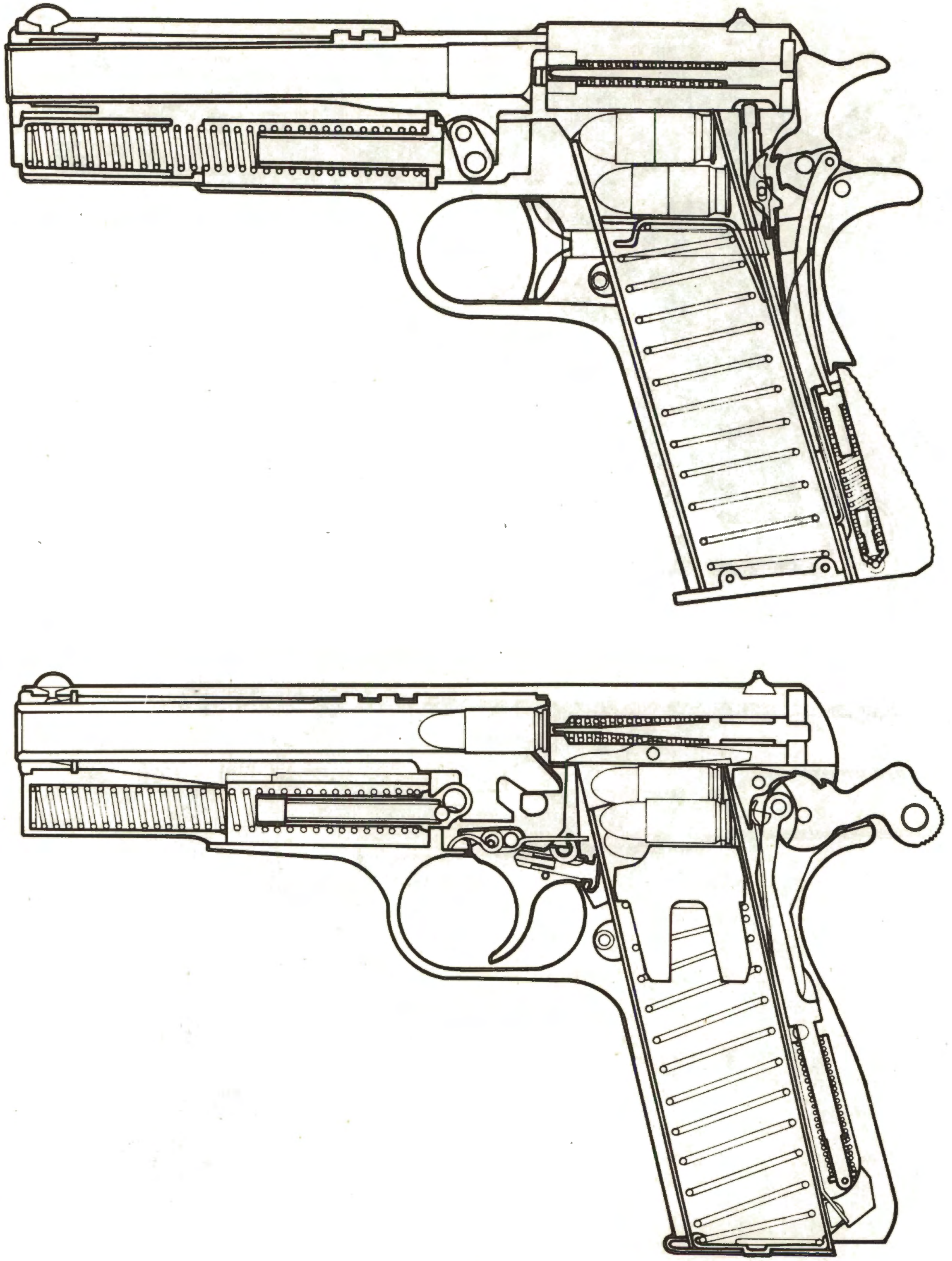


FIGURE 5–49. Comparison of sectional views of the .45 caliber (11.43mm) Colt Browning M1911A1 pistol and the 9mm Parabellum Browning-Saive Modèle 1935 GP pistol. (*Jimbo*)

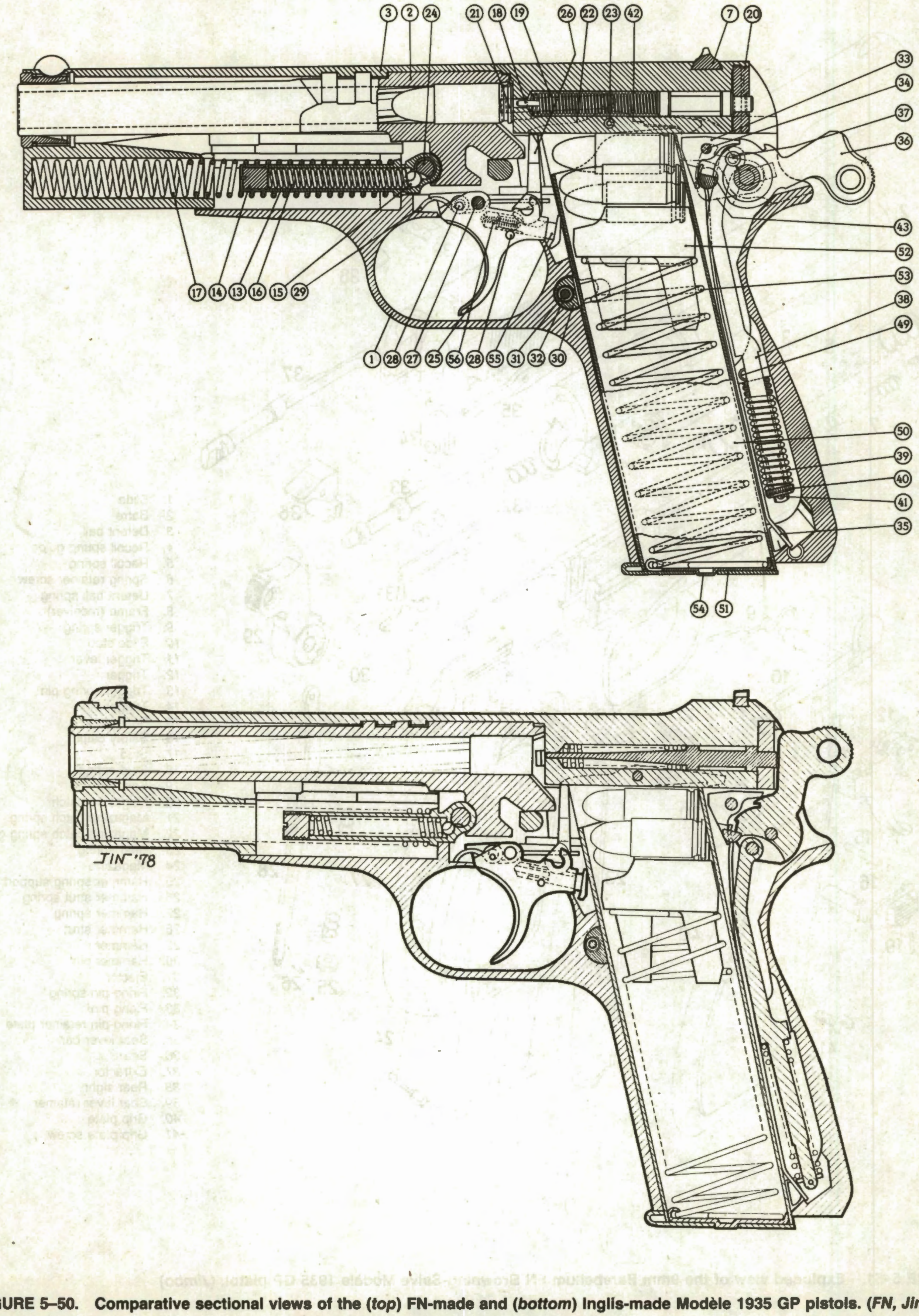
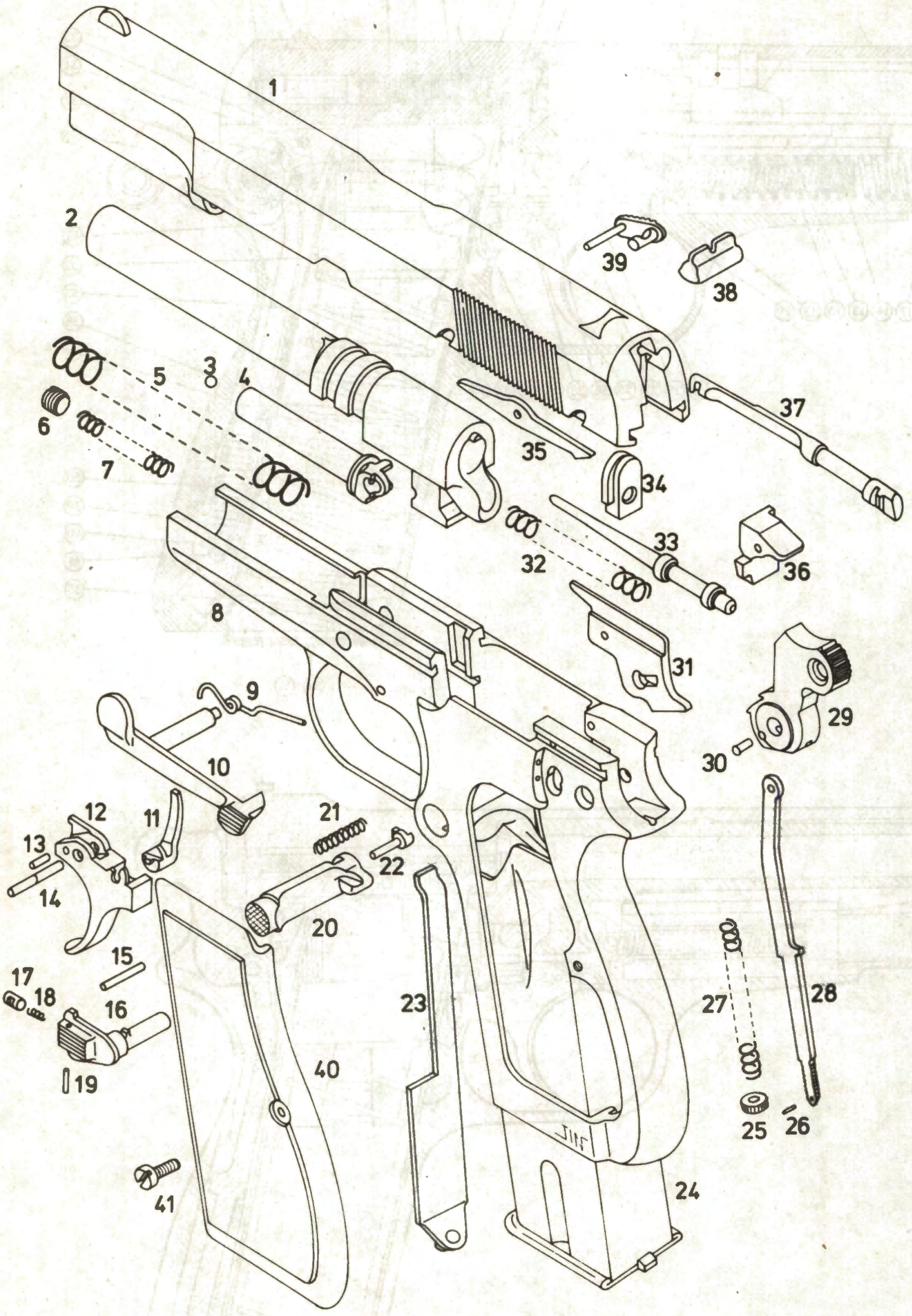


FIGURE 5–50. Comparative sectional views of the (*top*) FN-made and (*bottom*) Inglis-made Modèle 1935 GP pistols. (*FN, Jimbo*)



1. Slide
2. Barrel
3. Detent ball
4. Recoil spring guide
5. Recoil spring
6. Spring retainer screw
7. Detent ball spring
8. Frame (receiver)
9. Trigger spring
10. Slide stop
11. Trigger lever
12. Trigger
13. Trigger spring pin
14. Trigger pin
15. Sear pin
16. Safety catch
17. Stud
18. Stud spring
19. Sear pin
20. Magazine catch
21. Magazine catch spring
22. Magazine catch spring guide
23. Sear spring
24. Magazine
25. Hammer spring support
26. Hammer strut spring
27. Hammer spring
28. Hammer strut
29. Hammer
30. Hammer pin
31. Ejector
32. Firing-pin spring
33. Firing pin
34. Firing-pin retainer plate
35. Sear lever bar
36. Sear
37. Extractor
38. Rear sight
39. Sear lever retainer
40. Grip plate
41. Grip plate screw

FIGURE 5–51. Exploded view of the 9mm Parabellum FN Browning-Saive Modèle 1935 GP pistol. (*Jimbo*)

FIGURE 5–52. Asian copy of the FN Browning 7.65mm Modèle 1900 self-loading pistol. This specimen is marked "SSTSEBUE-BANBBPOFFAPARA. SA SUISI," which would not fool a knowledgeable buyer. (*U.S. Army*)

FIGURE 5–53. A typical Eibar or Ruby-type Spanish pistol patterned after the operating mechanism of the Modèle 1903 FN Browning pistol. This example, serial number 50,845, was built by Arizmendi Zulaica of Eibar and bears markings for the French military. This pistol has an 84-millimeter barrel, is 164 millimeters overall in length, weighs 856 grams, and has a nine-shot magazine. (*Mezger and Hess*)

FIGURE 5–54. A 7.65mm Browning caliber pistol built by the Alkarstuna Fabrica de Armas in Guernica, Spain. This example (serial number 8329) is a copy of the Modèle 1903 FN Browning pistol, with the slide profiled to resemble the Modèle 1910. With an 84-millimeter barrel, this pistol is 155 millimeters long (rifling twist 6 left). (*Krcma*)

FIGURE 5–55. This 7.65mm Browning caliber Rex automatic pistol has design features borrowed from the Modèle 1903 and 1910 FN Browning pistols. The recoil spring is mounted coaxially about the barrel. Manufactured by Gregorio Bolumburu of Eibar, this particular example is serial number 566. It has an 88.5-millimeter barrel (rifling twist 6 right) for a 155-millimeter total length and weighs 651 grams. It is interesting to note the loaded chamber indicator on the top of the slide. (*Krcma*)

FIGURE 5–56. This 7.65mm Browning caliber Mars pistol was manufactured by Kohout and Spolecnost of Kdyne, Czechoslovakia. This pistol (serial number 19,365) is based on the Modèle 1910. (*Krcma*)

FIGURE 5–57. The 7.65mm Browning caliber DWM pistol, which was a close copy of the Modèle 1910 FN Browning. This pistol has an 88-millimeter barrel for a total length of 153 millimeters, and it weighs 573 grams. (*Krcma*)

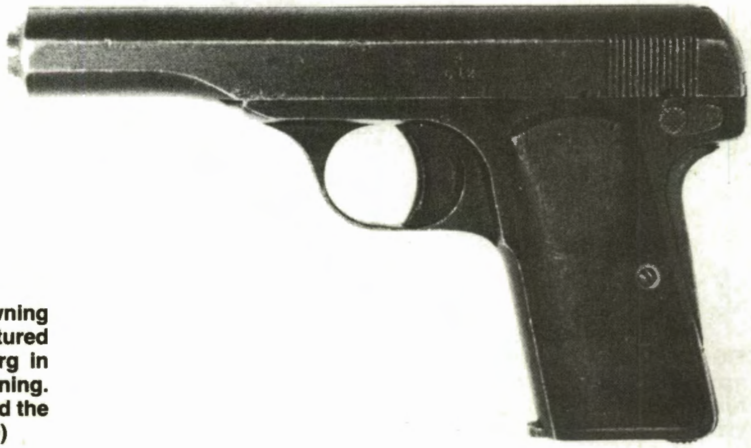


FIGURE 5–58. The Finnish pistol m/Ahlberg, 7.65mm Browning caliber. Approximately 1,300 of these pistols were manufactured from 1918 to 1920 by a private gunsmith named Ahlberg in Turku, Finland. It is a copy of the Modèle 1910 FN Browning. Production was halted because the maker had not acquired the necessary licensing from Fabrique Nationale. (*Sotamuseo*)

FIGURE 5–59. Assembed and disassembled views of the *11.25m/m Automatisk Pistol Model 1914* manufactured at the Kongsberg Våpenfabrikk in Norway. The assembled view bears serial number 18,008; the unassembled view is serial number 11,213. (*Krcma*)

FIGURE 5–60. Slide markings on three different Modelo 1927 Argentine-made M1911A1 pistols. (*Krcma, Johnson, Nonte*)

FIGURE 5–61. Disassembled view of the Argentine-made *Pistola Automatica Sisteme Colt, Calibre 11,25mm Modelo 1927*. (Krcma)

FIGURE 5–62. The Ballester-Molina pistol, an unauthorized copy of the Model 1911A1 Colt Browning. (*U.S. Army*)

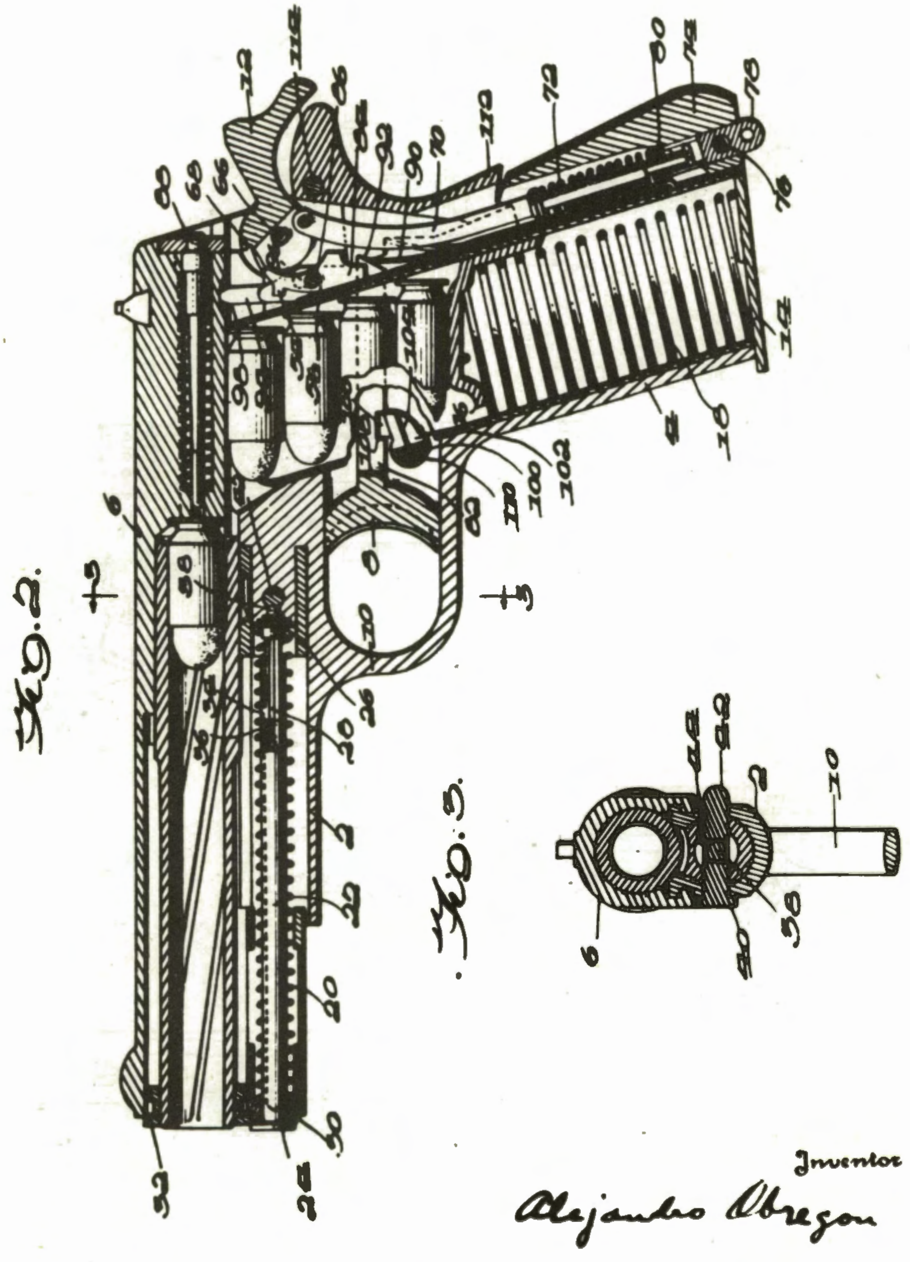
FIGURE 5–63. A Ballester-Molina pistol with Argentine *Policia Federal* markings. (*Tokoi*)

FIGURE 5–64. Assembled and disassembled views of the Obregon pistol. This specimen has no serial number. With a 123-millimeter barrel, the pistol measures 217 millimeters in length and weighs 1,055 grams. Its magazine capacity is seven (rifling twist 6 left). (*Krcma*)

ril 26, 1938. A. OBREGON 2,115,041

AUTOMATIC LOADING FIREARM

Filed Feb. 4, 1935 3 Sheets-Sheet 2



Inventor

Alejandro Obregon

By Vernon E. Hodges

his Attorney

FIGURE 5–65. U.S. patent specification drawing for the Obregon pistol. (*U.S. Patent Office*)

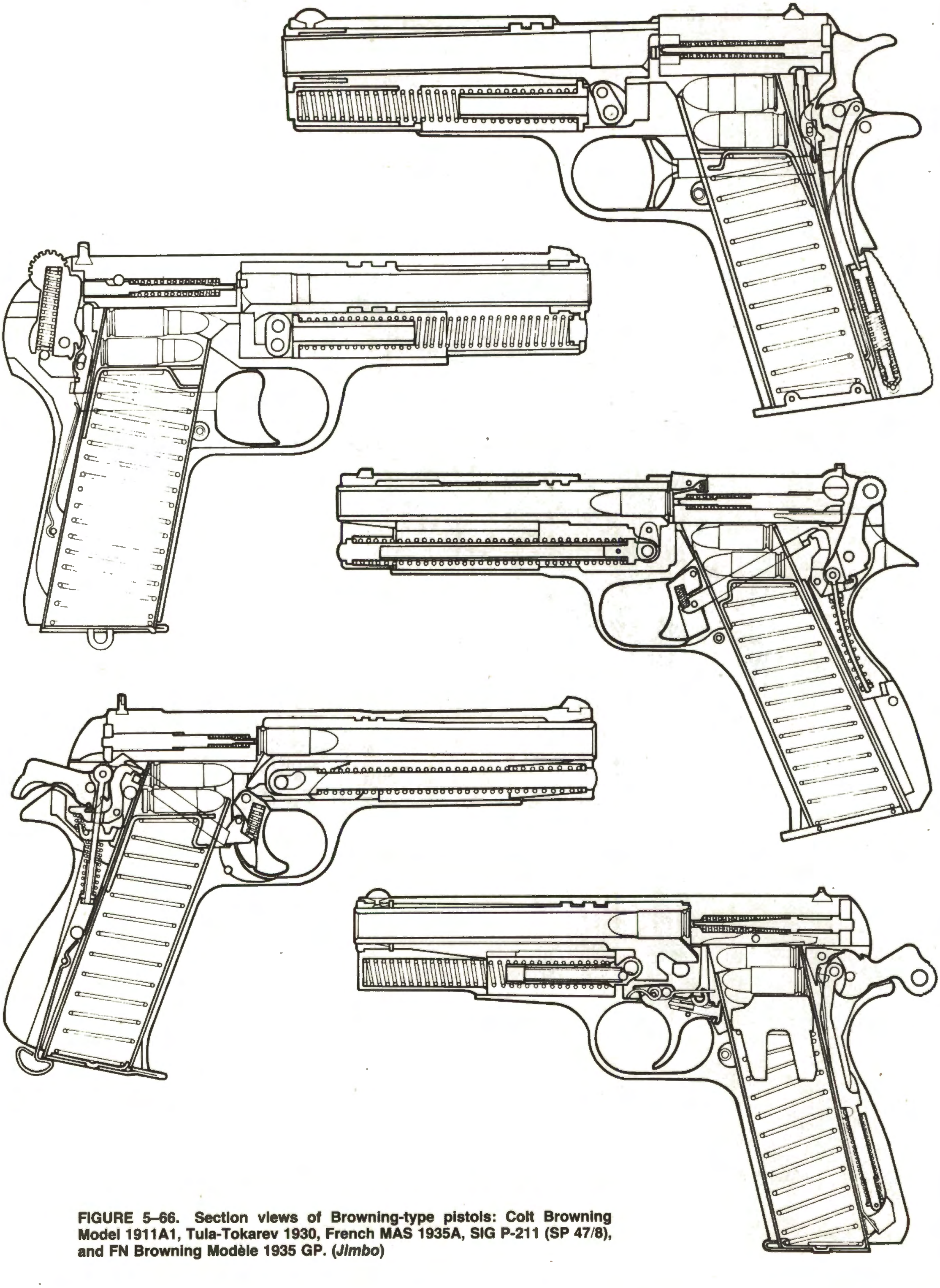


FIGURE 5–66. Section views of Browning-type pistols: Colt Browning Model 1911A1, Tula-Tokarev 1930, French MAS 1935A, SIG P-211 (SP 47/8), and FN Browning Modèle 1935 GP. (*Jimbo*)

FIGURE 5–67. The Polish 9mm Parabellum Vis pistol (*Pistolet wojskowy wzor Vis 1935*) as built by the Fabryka Broni Radomu in Radom. This pistol (serial number Z1081) is 203.5 millimeters long with a 118.5-millimeter barrel (rifling twist 6 right). It weighs 1,016 grams and has an eight-shot magazine. (*Krcma*)

FIGURE 5–68. A wartime Model 1935 Polish Vis pistol built at Radom for the Heerswaffenamt as the Pistole P35(p). Note the wood grips and phosphate finish. (*Krcma*)

6 AMERICAN MILITARY HANDGUNS 1900 TO 1945

John M. Browning's Fabrique Nationale-made pistols are only half of the Browning story. In the United States, the Colt Patent Firearms Manufacturing Company also built Browning pistols, allowing Colt to extend its military handgun monopoly in this country into the self-loading era. From 1847 to 1945, the standard United States handgun was a Colt. On several occasions—the Civil war and the two World Wars—other makes of handguns were pressed into service, but otherwise the name Colt was synonymous with American military revolvers and pistols.

Designer Carl J. Ehbets and his colleagues at Colt had begun to examine the self-loading handgun in the early 1890s. On 29 October 1894, Ehbets filed for his first self-loading pistol patent (U.S. patent 570,388 of 27 October 1896). It had a revolver-type grip, similar to the 1892 Colt New Army, a gas-operated mechanism, and a Bergmann-style feed system (see chapter 8). The prototype fired a rimmed revolver cartridge. Ehbets' second autoloader (U.S. patent 580,935 of 20 April 1896) was a blow-forward model, very similar in design concept to the 1894 Mannlicher (see chapter 7). This overly complex design, also called for a rimmed cartridge. Neither of Ehbets' pistols got beyond the toolroom stage, primarily because on 20 April 1897 John Browning received patents for four self-loading pistols that were judged better designs than those of the Colt employee. One of Browning's patents led to the Model 1900 Colt, another to the Fabrique Nationale Modèle 1899/1900. From 1896 until their deaths, Browning (1855–1926) and Ehbets (1845–1926) worked together whenever Browning came to Colt, but the years between 1895 and the beginning of the First World War were their most important years of collaboration. From 24 July 1896 when Browning and Colt officials signed an agreement that allowed Colt to manufacture Browning's pistols in the United States, every self-loading pistol made by the Connecticut firm was based on his designs.

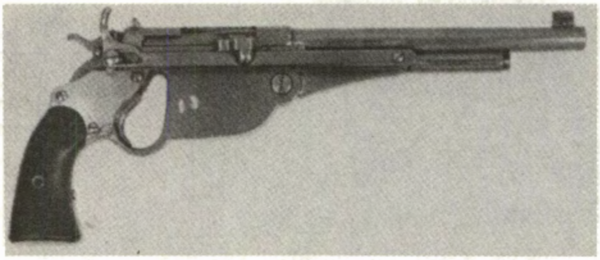


FIGURE 6–1. Carl J. Ehbets' first self-loading pistol (U.S. patent 570,388). Note the influence of revolver design. (*Johnson and Haven*)

FIGURE 6–2. Ehbets' second self-loader design (U.S. patent 580,935). (*Bady-Aberman*)

BROWNING'S PATENTS OF 20 APRIL 1897

Two of Browning's designs—his first self-loader, which was gas-operated (U.S. patent 580,923), and the prototype for the FN Modèle 1899/1900 (U.S. patent 580,926)—are described in chapter 5. Of the other two patented handguns, only one (U.S. patent 580,924) was manufactured. It proved to be the grandfather of all Browning pistols that would use a swing link to raise and lower the barrel during the locking and unlocking cycles. The top of the barrel had transverse ribs and recesses that mated with corresponding cuts and projections in the slide. In the ready-to-fire position, the barrel was locked into these cuts and projections. When the slide recoiled, the links (one fore and one aft) drew the barrel downward, thus permitting the slide to recoil to the rear. The original prototype ejected its cartridge nearly straight up. A later model had the ejection port cut into the right side of the slide. An example of this type was test-fired at Colt on 29 June 1896 and was subsequently chosen for production in Hartford. By the fall of 1898, Colt workers had made a small number of these pistols for demonstration purposes.

John Browning granted Colt a license on 24 July 1896 to manufacture his pistols and sell them in the United States, Great Britain, and Ireland. On 7 July 1897, he gave Fabrique

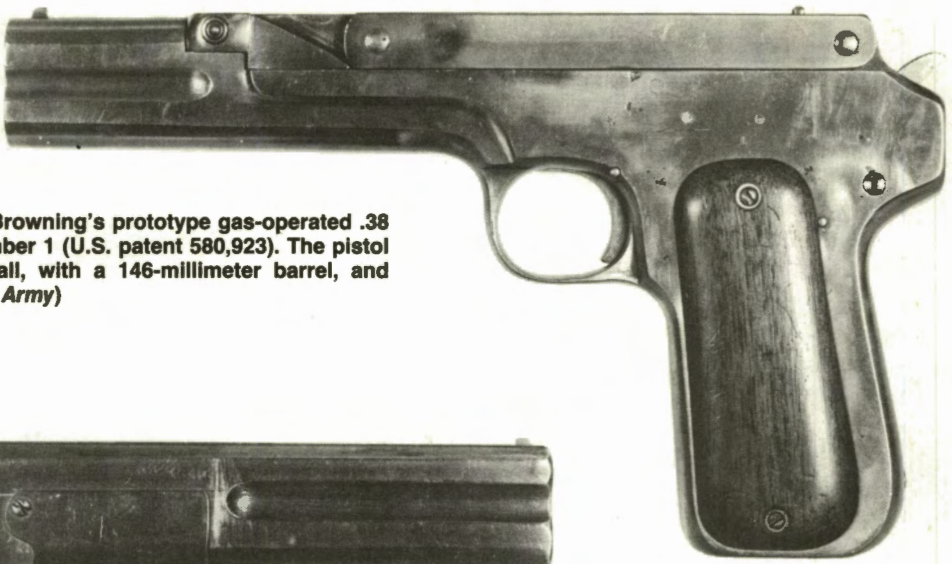


FIGURE 6–3. John M. Browning's prototype gas-operated .38 caliber pistol, serial number 1 (U.S. patent 580,923). The pistol is 216 millimeters overall, with a 146-millimeter barrel, and weighs 964 grams. (*U.S. Army*)

FIGURE 6–4. Browning's prototype recoil-operated .38 caliber pistol (U.S. patent 580,924), which was the basis for the Model 1900 Colt automatic pistol. This design is 225 millimeters overall, with a 146-millimeter barrel. It weighs 907 grams. (*U.S. Army*)

FIGURE 6–5. Browning's prototype rotating-barrel recoil-operated .38 caliber pistol (U.S. patent 580,925). The pistol is 222 millimeters in overall length, with a 149-millimeter barrel. Weight is 907 grams. (*U.S. Army*)

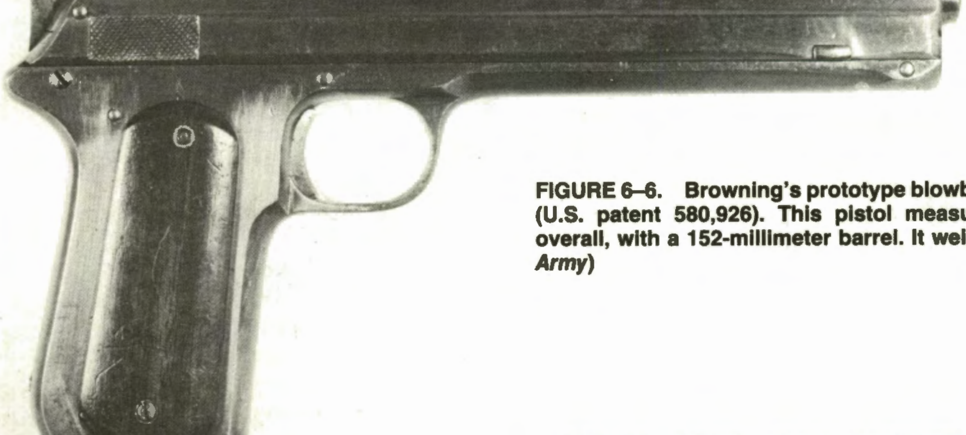


FIGURE 6–6. Browning's prototype blowback .32 caliber pistol (U.S. patent 580,926). This pistol measures 229 millimeters overall, with a 152-millimeter barrel. It weighs 907 grams. (*U.S. Army*)

THE 20 APRIL 1897 PATENTS OF JOHN M. BROWNING.

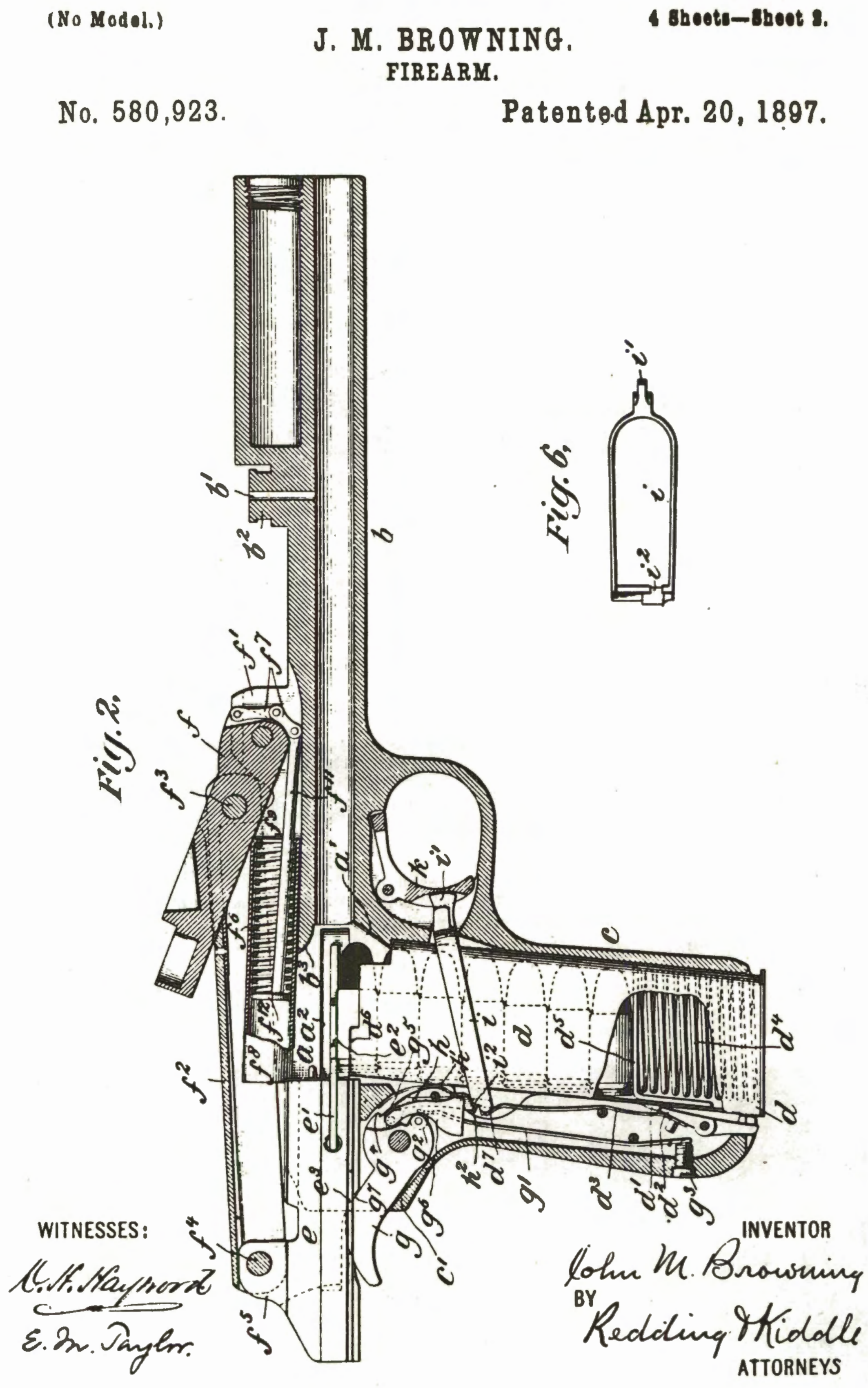


FIGURE 6–7. **Browning's experimental gas-operated .38 caliber pistol, as illustrated in the patent drawing. (*U.S. Patent Office*)**

(No Model.) 3 Sheets—Sheet 2.

J. M. BROWNING.
FIREARM.

No. 580,924. Patented Apr. 20, 1897.

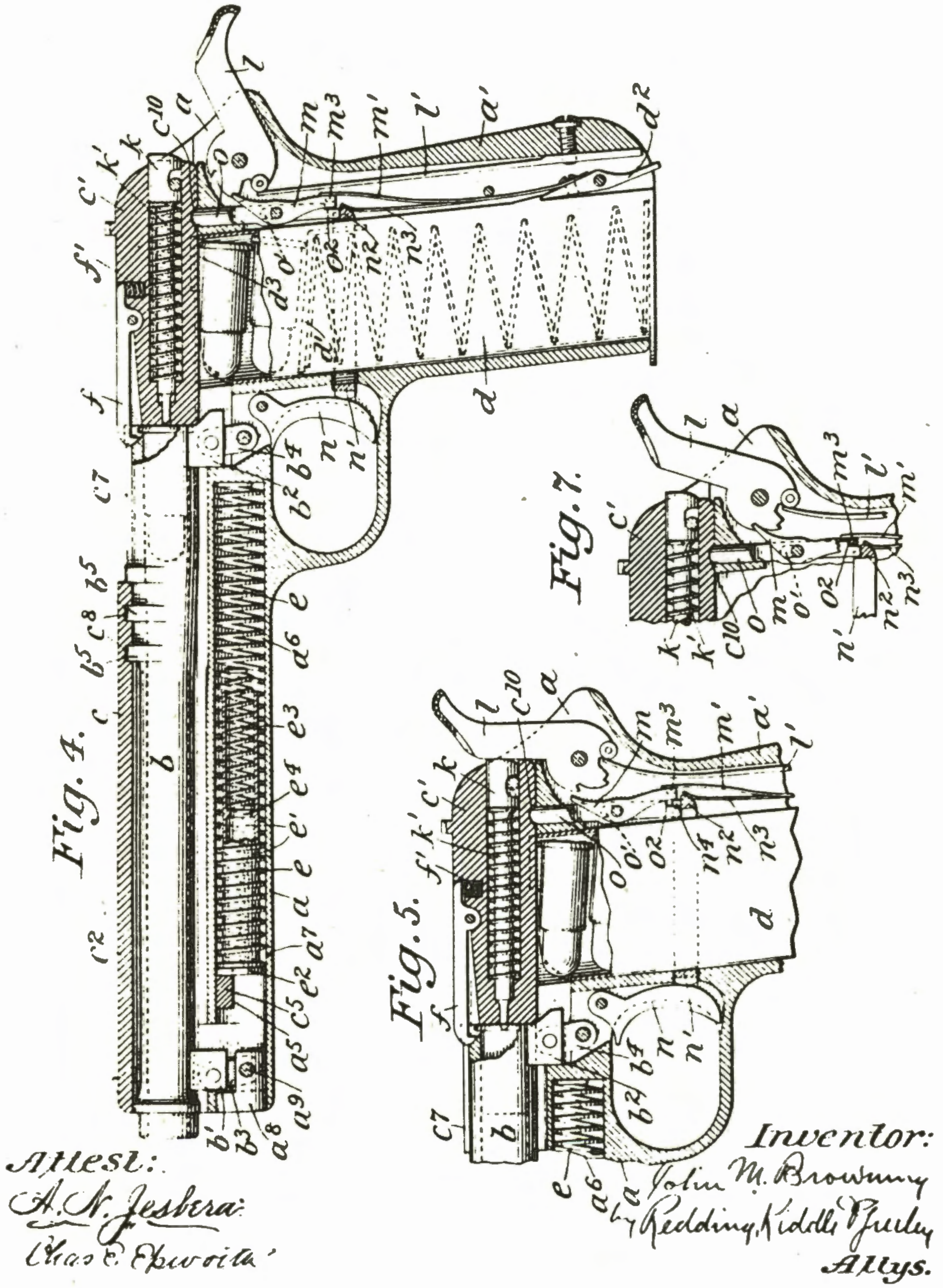


FIGURE 6–8. John Browning's .38 caliber pistol patent that served as the pattern for the Model 1900 Colt. (*U.S. Patent Office*)

(No Model.) 3 Sheets—Sheet 3.

J. M. BROWNING.

FIREARM.

No. 580,925. Patented Apr. 20, 1897.

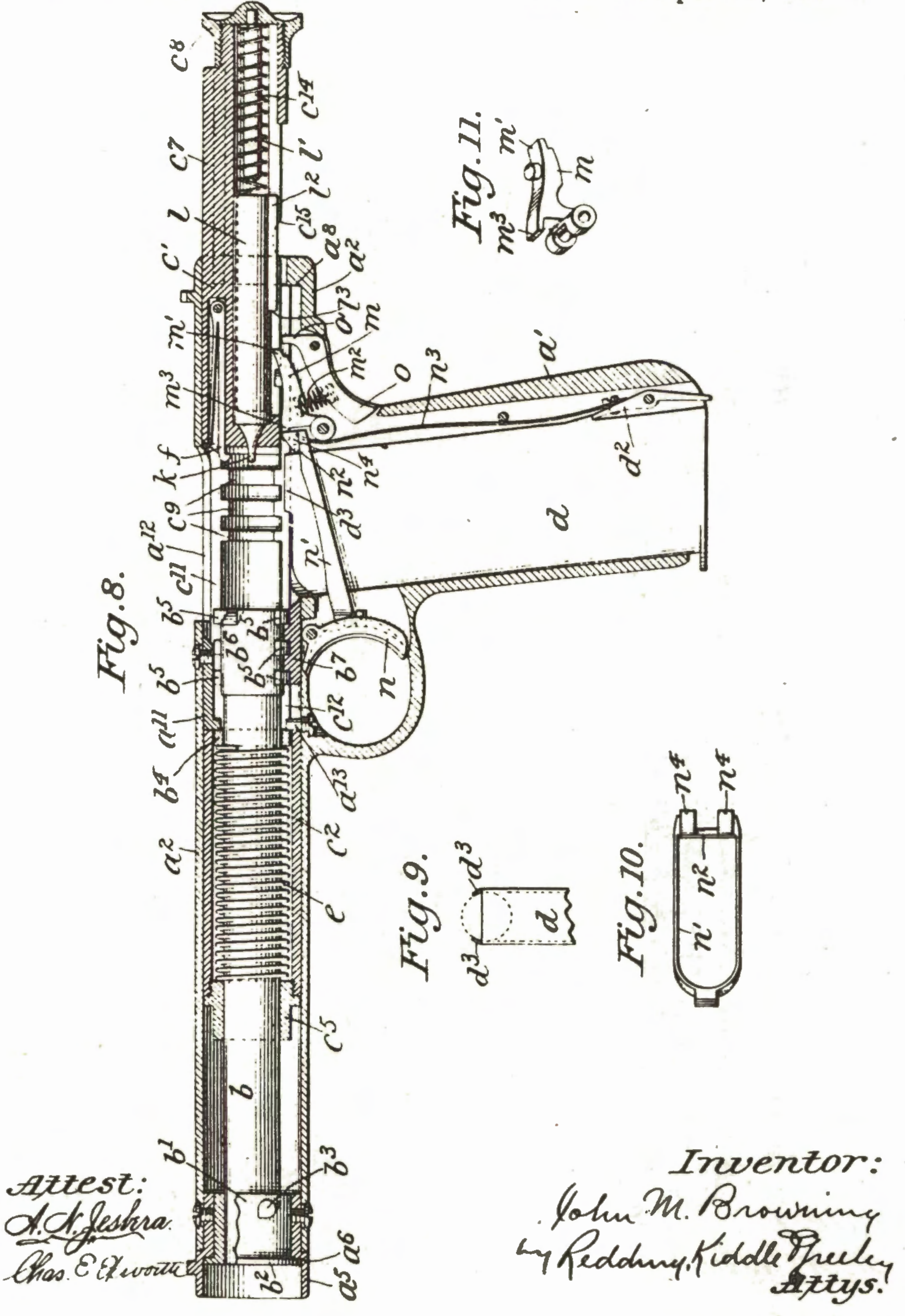


FIGURE 6–9. Browning's experimental .38 caliber rotating-barrel pistol. (*U.S. Patent Office*)

(No Model.)

2 Sheets—Sheet 2.

J. M. BROWNING.

FIREARM.

No. 580,926.

Patented Apr. 20, 1897.

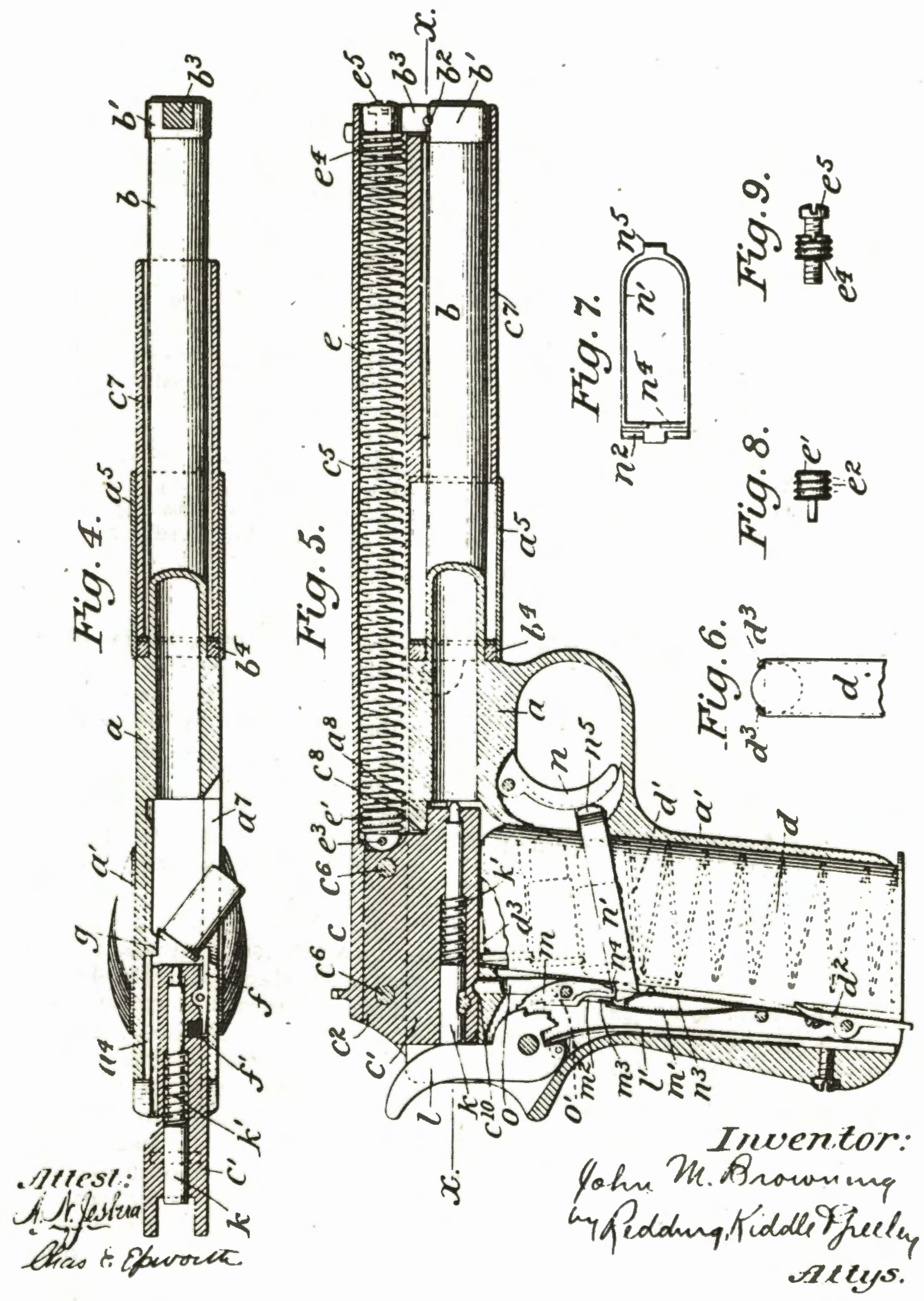


FIGURE 6–10. Browning's concept for a recoil-operated, blowback pistol. It served as the basis for the design of the Fabrique Nationale Browning Modèle 1899–1900. (*U.S. Patent Office*)

TABLE 6-1 COMPARATIVE DATA FOR SELF-LOADING PISTOLS TESTED BY SPRINGFIELD BOARD OF OFFICERS, 1899–1900

	*Mauser C96**	*Colt Browning*	*Mannlicher 1894*
Caliber	7.63 × 25mm	9 × 23SR	7.6mm
Overall length (mm)	305	229	222
Weight (grams)	1,120	1,020	964
Number of parts	38	47	26
Barrel length (mm)	140	152	184
Feed device capacity	10-shot fixed	7-shot detachable	5-shot fixed
Bullet weight (grams)	5.5	6.8	7.3
Velocity at 16 meters (meters per second)	409	388	243

*Not including shoulder stock.

Nationale the right to sell in Belgium, France, Germany, Austria-Hungary, Spain, and elsewhere (except in certain territories assigned to Colt by FN in instances where FN acquired patents in Browning's behalf). All other countries were open to either firm.* Colt paid Browning a royalty of $1.00 on each pistol they sold, and the designer agreed to license all of his subsequent pistol designs to Colt, with the company bearing the costs of securing the patents.

With business arrangements taken care of, Browning and Colt went out to secure the sale of his pistol to the U.S. Army. Chief of Ordnance Daniel W. Flagler authorized the first test of the .38 caliber (9mm) Colt Browning pistol in October 1898, and the pistol was placed before the board responsible for testing handguns on 9 November. Instead of firing a rimmed revolver black powder cartridge, the 1898 Colt Browning was chambered for the .38 semi-rimmed smokeless powder cartridge (9 × 23mm SR).

Evolution of the Model 1900 Colt Browning Pistol

The 1898 U.S. Army Board of Officers† had been called to review the suitability of the .38 caliber Colt New Model Army Revolver and to consider the possible adoption of self-loaders (see chapter 2). The board traveled to the Colt factory in Hartford on 11 November, where they had an opportunity to shoot Browning's automatic pistol. The first trials went well and helped to get the U.S. Army's experiments with self-loaders off on a positive note. Less than a year had passed since Hans Tauscher demonstrated the C93 Borchardt pistol at Springfield Armory, and the two satisfactory trials with completely different designs indicated that the self-loading pistol was a concept that merited further study. While the report of the 1898 Board concentrated on improvements needed in revolvers, the officers had the following remarks about the self-loader:

> The Board is of the opinion, based upon a careful examination of the Borchardt, the Mannlicher, the Mauser, the Colt and the Bergmann repeating weapons, that the development of this type of pistol has not yet reached such a stage as to justify its adoption in place of the revolver for service use; and in case of the adoption of such an arm in the future, the Board believes it would be inexpedient to allow it to displace the carbine, the latter being a long range weapon of precision for dismounted fire action, while the former, with its shorter barrel and attachable stock, is . . . better adapted for use as a short range weapon for rapid use while mounted.

The self-loader clearly had promise if designers allowed their weapons to mature and if the new handguns were employed for combat roles they could reasonably fill.

The 1899 Board of Officers had a busy test season. During August, Major John E. Greer, Captain John T. Thompson, and Lieutenant Odus C. Horney tested the new .38 Colt revolver (which became the New Service Revolver) and the new .38 Smith & Wesson Hand Ejector Model (known variously as the 1899 Military Model, the Military & Police, or the K frame .38). As early as September, Major Greer requested that the Chief of Ordnance ask Colt to submit examples of their new self-loading pistol as soon as possible so that it could be tested against the blow-forward Mannlicher and the C96 Mauser pistols. Due to the late delivery of the Colt Browning pistol (mid-January 1900) and the absence of the Mannlicher representative, Fendall S. Pegram, the Board was forced to test the pistols one at a time.

Major Greer called the board to order on 16 November 1899. They examined the Mauser pistol and then adjourned their work until ammunition for that pistol arrived a few days later. Testing of the Mauser began in late November and continued until about 5 December. The board adjourned again until 6 February, when tests of the Colt Browning were begun. During the second or third week of February, the officers shot the Mannlicher pistol.

---

*On 1 July 1912, Colt and FN further divided the world market. Colt got the United States, Greenland, Canada, Mexico, and Central America. FN took Continental Europe. FN had the right to make commercial sales in Great Britain and Canada, but had to pay Colt 1.50 Belgian francs ($.29) per pistol for the life of their patents. Royalty payments were changed to 3 francs ($.14) on 1 January 1925 to account for the devaluation of the franc.

†Major D. T. Taylor, Captain G. A. Dodd, Captain S. W. Taylor, and 1st Lieutenant E. L. Phillips.

FIGURE 6–11. Browning's .38 caliber prototype of the Colt Model 1900 pistol. Note the ejection port on the right side of the slide. (*U.S. Army*)

At the end of the trials, the officers had the data in Table 6–2 by which they could compare these three pistols. By mid-February, the board had decided to test the Colt Browning further. As the officers noted in their report: "The action of this pistol during the . . . test was so satisfactory to the board that they were of the opinion that it was a suitable arm for the service, but they decided to make additional endurance tests in order to determine what weaknesses would be developed by long-continued firing, and to discover, if possible, what was the actual life of the pistol." The main limiting factor

TABLE 6-2 PERFORMANCE DATA

	Mauser C96	*Colt Browning*	*Mannlicher 1894*
Number of 25.4mm pine boards penetrated at 22.8 meters	**8**	**7**	**6.3**
Mean bullet spread at 22.8 meters from a rest (mm)	**28.4**	**13.3**	**49.8**
Rapid-fire accuracy at 22.8 meters	**17 out of 30 in 86.5 seconds**	**12 out of 28 in 74.5 seconds**	**19 out of 30 in 244.5 seconds**

for further testing was the availability of ammunition, since the Colt Browning .38 cartridge was still a limited production item.

On 19 February 1900, the board fired the Colt Browning 900 times, stopping only to cool the pistol after each string of 50 shots. Major Greer wrote to Lieutenant Colonel Frank H. Phipps, Springfield Armory commanding officer, on 2 March asking for funds to purchase more .38 caliber ammunition. The pistol was still giving excellent results, but Greer and his colleagues wanted to shoot the pistol "until it is worn out." The new supply of cartridges arrived on 22 March, and the testing was resumed. Some problems were encountered with the trigger mechanism between the 51st and the 200th shots in the latter series of demonstrations. The men testing the pistol disassembled it, but could not find the source of the difficulty. Subsequently, the pistol was fired 500 more times without a hitch. New problems with the trigger occurred on the 717th and 764th rounds, and at the 801st the barrel was damaged when the rear locking link pin broke. W. J. Buckley, a Colt armorer, replaced the barrel and link pin, and the shooting resumed again on 5 April. After 558 more shots, the rear link pin broke again. Later, a front link pin broke. When the shooting was finally suspended—they ran out of ammunition—the Colt Browning pistol had been fired 5,800 times. The board noted in its report that "the only weakness shown was in the long link pins. There should be little difficulty in remedying this."

The board was clearly impressed with the Browning-designed self-loader. Their conclusions and recommendations are quoted here at length, as their statements made a case for further experimentation with the Colt Browning.

> Colt automatic pistol.—The test to which this pistol was subjected was in every way more severe than that to which revolvers have been heretofore subjected, and the endurance of this pistol appears to be greater than that of the service revolver.
>
> It possesses further advantages as follows:
> Very simple construction.
> It is easy to operate.
> It is not liable to get out of order.
> It is capable of a very high rate of fire.
> It can be conveniently loaded with either hand.
> It gives a high initial velocity and flat trajectory.
> It is more accurate than a revolver.
>
> The plant for its manufacture has been completed, and in case of necessity the pistols could be obtained promptly and in quantities.
>
> It has, in common with the other automatic pistols tested, the disadvantage of a light bullet, and therefore lacks the "stopping power" of the revolver. By reducing the velocity, however, the weight of the bullet can be increased accordingly; or, if desired, the caliber can also be increased, and the manufacturers state they are prepared to manufacture an automatic pistol of caliber 0.41" which is in all other respects identical with the one tested.
>
> In the opinion of the board, this pistol is a suitable arm for use in the U.S. service, and it possesses numerous advantages over the revolver.

In contrast, the board considered the Mauser C96 to be "large and cumbersome" and overly complicated for manufacture. In addition, its 7.63mm caliber was too small. While the specialists praised the Mannlicher 1894's simple construction, they judged its loading system to be "very tedious and slow," almost impossible for a man on horseback to work.

Before proposing the adoption of the Colt Browning, the Board wanted to see the results of field trials, and Major Greer and his fellow officers recommended the purchase of a number of .38 pistols for issue to officers in the field. The board also suggested that "The officers to whom they are issued for trial should be informed that the test is to determine the suitability of the system for our service, and should be requested to make reports as to the results of their trials, and to state whether, in their opinion, the caliber adopted for the service should be larger than that of the pistol tested (caliber .38)."[1] Colonel Phipps at Springfield Armory approved these recommendations and forwarded them to Chief of Ordnance Brigadier General A. R. Buffington.

Pursuing the acquisition of 100 Colt Browning pistols for field trials, Colonel Phipps determined that Colt could provide 25 pistols by 9 May 1900 and 75 more by 1 June at a unit cost of $25. Ammunition could be provided at $18.53 per 1,000 cartridges. These delivery dates and prices being acceptable, Captain Thompson was assigned to inspect the pistols as they were delivered to Springfield. Thompson accepted the first 50 weapons on 12 May.* As pistols and ammunition became available, they were shipped overseas to American troops for field testing.

As a result of the American war with Spain in 1898, United States military forces were stationed overseas in various locations. During the first ten years of the new century, the U.S. Army Ordnance Department carried out handgun field trials in the Philippine Islands, in Cuba, and in Puerto Rico. In the Philippines, the new pistols were often used in combat against the Moro insurgents (Muslim separatists who had previously

*These first fifty pistols were serialed 11, 12, 59, 60, and 87 through 132. The second fifty were numbered 133 through 183. They were marked *J.T.T.* on the right grip inside a rectangle, with *1900* stamped above Captain Thompson's mark.

fought with the Spanish for their religious freedom). By 2 June 1900, fifty .38 caliber Colt Browning pistols had been shipped to Manila, twenty-five to Havana, and twenty-five to San Juan. Letters from officers reporting on the new handgun can be taken as representative. Captain Robert Alexander, 11th U.S. Infantry, in San Juan, believed the pistol to be simple and strong. He also reported that it worked best when clean and when it and its ammunition had been slightly oiled. Although an infantry officer, Captain Alexander suggested that the pistol might be ill-suited for cavalry use because it required both hands for cocking. Captain H. W. Wheeler, 5th U.S. Cavalry, in Aibonito, Puerto Rico, also liked the new pistol: "In my opinion this weapon is an admirable one and I am in favor of its adoption for the cavalry service. While its automatic mechanism makes it a dangerous weapon to the individual trooper, if he be a poor horseman and careless in handling fire arms, this should not condemn it; a trooper who may not be trusted with such a weapon evidently is unfitted for the service and should be discharged." Captain Wheeler thought that the serrations provided for grasping the pistol when operating the slide should be moved from the rear of the slide to the center. He added that considerable training would be required to teach troopers how to change magazines at a gallop.

Major Eben Swift, Puerto Rican Regiment, U.S. Volunteer Infantry, a frequent letter writer on ordnance matters, sent his comments in from Cayey. He did not like the idea of a pistol being cocked and ready to fire after each shot, and he would have preferred a double-action mechanism. He believed that the Model 1900 Colt would be very dangerous in the hands of most soldiers and that it would waste ammunition. He repeated his frequent plea for a .45 caliber (11.43mm) handgun rather than a .38 caliber (9mm) weapon.

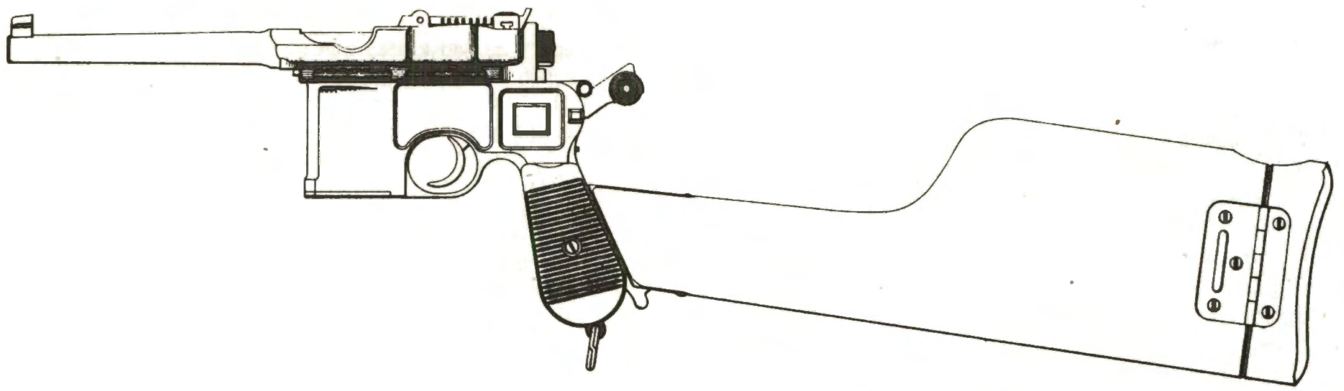
First Lieutenant Lawson M. Fuller, chief ordnance officer in the Philippines, wrote to the Ordnance Office in Washington with his suggestions for modification and improvement of the Colt pistol. Noting that "the balance of the pistol seems poor, muzzle heavy," and that the grip was too short for the average hand, he suggested that the pistol could be improved "by the addition of .4 inch to the length of the grip. . . . This would accommodate one more cartridge, improve the balance and very greatly improve the grip." Lieutenant Fuller also thought that the serrations on the slide provided for grasping the slide when cocking it should be moved from the rear to the front of the slide since that was "the natural position to clutch the slide for cocking." The wooden grips could be improved by enlarging and checkering them. Despite these shortcomings, Fuller added that there was a great demand for self-loading pistols from American officers in the Philippines, and he could use 200 as soon as possible.

Colonel Frank Phipps reported on all of these comments to the chief of ordnance on 16 November 1900:

> The criticisms of the officers testing the Colt Automatic Pistol have been carefully considered. There seems to be a very general objection to the arm on the ground that it requires both hands to load it for the first shot and that it requires considerable time "to get off the first shot." This objection is probably well founded and is of considerable tactical importance. It would be minimized, however, if the pistol were habitually carried loaded, with the safety on. The cocking of the piece could then be done with one hand, and the raising of the safety could also be accomplished, though with considerable inconvenience. If the piece is carried loaded with the safety on, it is then a safer weapon (in the holster) than the revolver.
>
> The balance of the arm is criticised by a number of officers, only one commending it. . . .
>
> The objection that the clip forms an essential part of the arm and in case it becomes damaged, that the arm is thereby disabled, is largely correct, although the arm can, with inconvenience it is true, be fired as a single loader.
>
> The complaint that the arm is dangerous after the first shot when in the hands of an unskilled horseman, is probably well sustained, but it is an objection common to all automatic pistols.
>
> Criticism of the arm as to its probable durability, made by some of the officers, would be entitled to greater weight if an opportunity had been offered them to fire the arm a sufficient number of rounds to test this point. The pistol fired at this Armory, was uninjured, except in some minor parts, and with slight repairs could probably, so far as might be judged by the appearance of the arm, have been fired 6,000 rounds more.
>
> Lieut. Fuller, Ord. Dept., in his letter of October 2nd, 1900 . . . criticises the balance of the pistol and the grip, and states the latter is insufficient for the average hand and for accurate work. . . . He also thinks the natural position to clutch the slide for cocking is in front and that it should be roughened at the front rather than the rear.
>
> This criticism as to the position to clutch the slide for cocking is well taken, and this is recognized by the Colt Company, which will embody the improvement in future constructions. Increasing the length of the grip is a more serious matter, as to do this would take time and cause expense in making new fixtures. There seems to be some question as to the necessity for this change, judging from the criticisms of the officers in Porto Rico [sic]. It can be done, however, if deemed important.

To extend the field testing of the Model 1900 Colt Browning pistol, the Ordnance Department ordered 200 more handguns from Colt on 19 December 1900. These pistols, serial numbers 1501 through 1700, were delivered to Springfield on 1 February 1901 at a cost of $20 each with spare parts. Following recommendations from the field, the cocking serrations had been relocated on the forward portion of the slide, and wooden grip plates had been checkered. These pistols were stamped "US" on the left side of the trigger guards and "R.A.C." (for Rinaldo A. Carr, a civilian Ordnance Department inspector) on the right side. Of the 200, 197 of these modified Model 1900s were shipped to the Ordnance Depot in Manila, where by 9 February, 162 had been issued.

Of some 50 reports evaluating the new weapon from officers in the Philippines and from the 4th U.S. Cavalry in the western United States, the pistol was praised frequently for its accuracy (mentioned in 25 reports). The simplicity of its construction also got good marks (mentioned in 15 reports), as did the rapidity with which it could be discharged (mentioned in 6 reports). And four officers remarked positively on its ability to shoot eight times without requiring reloading, two more shots than with the revolver. The leading complaint about the Colt Browning pistol was one often heard about self-loaders in general; it required both hands to pull the slide back when loading (22 officers complained about this). When astride a rapidly moving horse with the reins in one hand, the user would have problems loading any self-loader. Some officers complained that this pistol was dangerous on horseback because the hammer had to be kept on full cock for immediate use. Thirteen officers reported that such a pistol



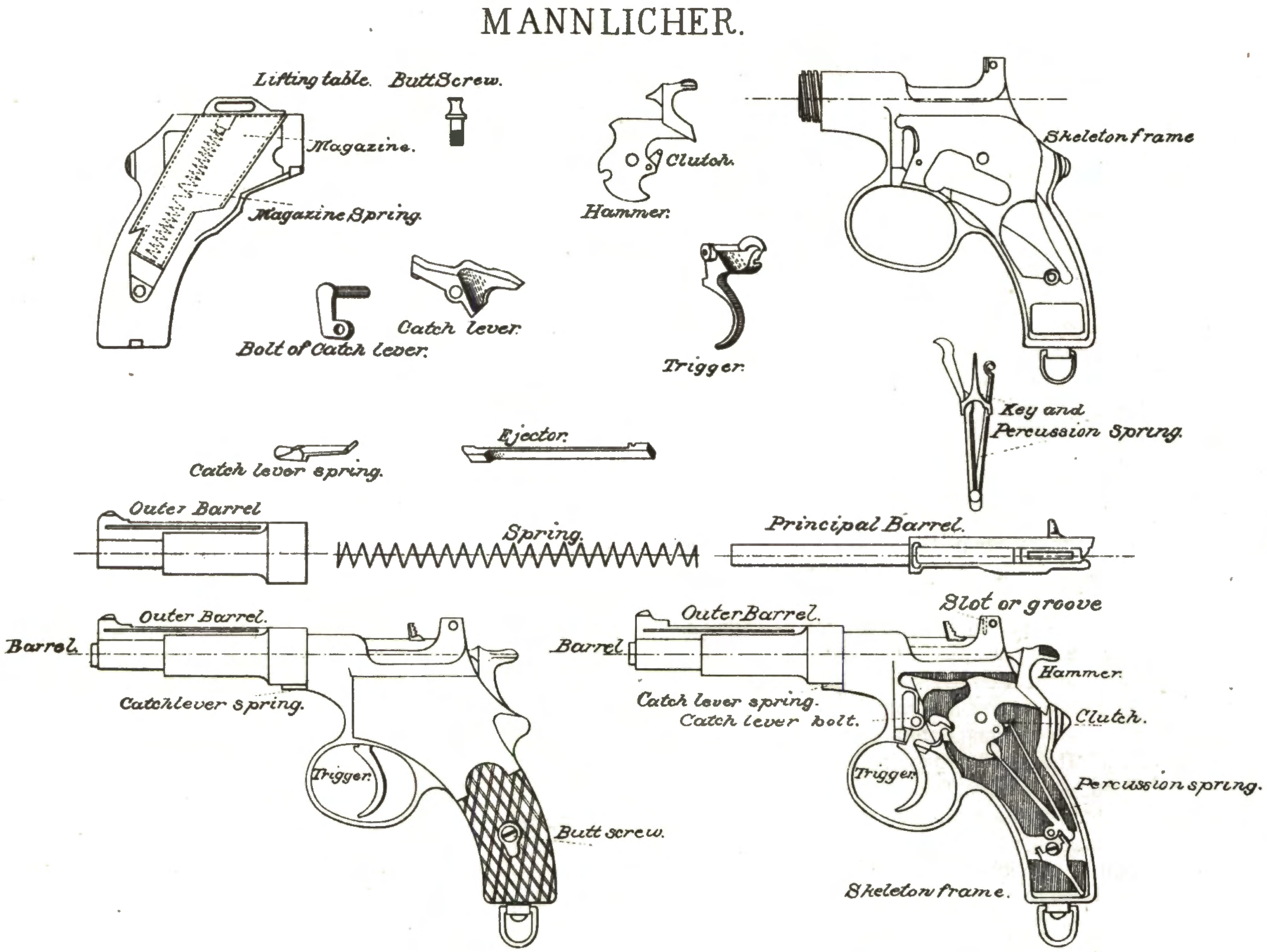
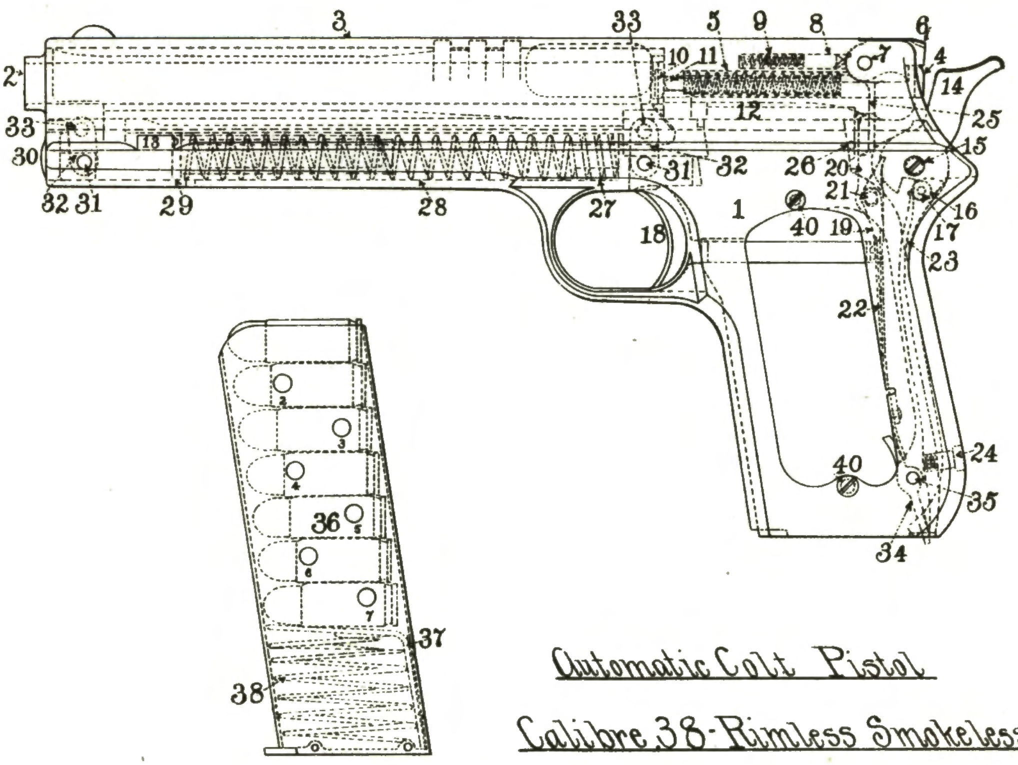
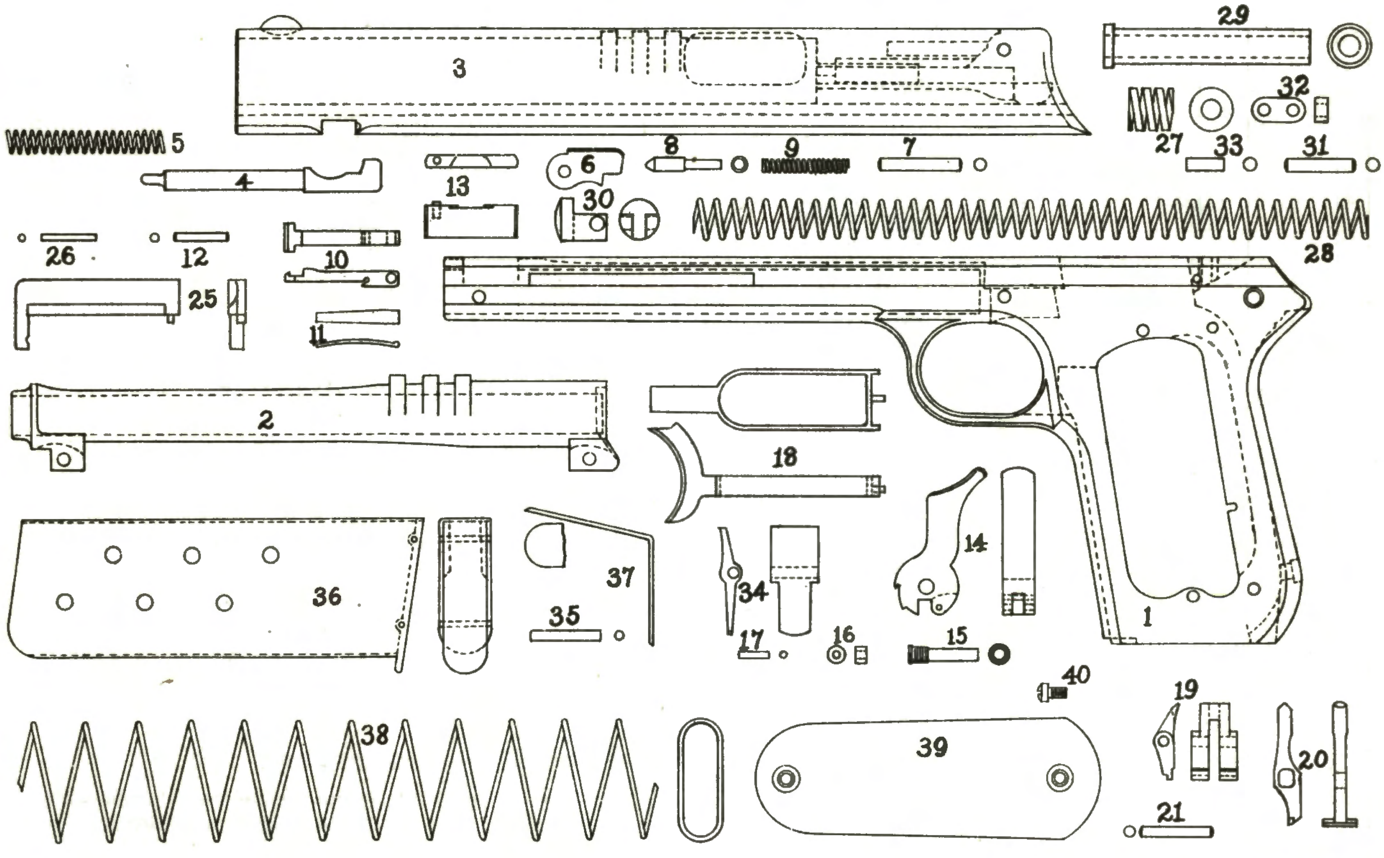


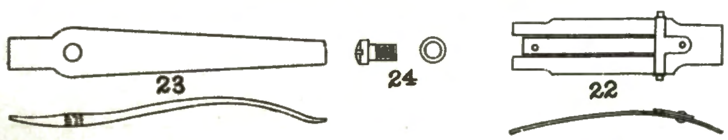
FIGURE 6–12. Three pistols tested by the U.S. Army in 1900. *From top,* the 7.63mm Mauser C96 self-loader; the 7.6mm Mannlicher 1894; and on next page two views of the Model 1900 .38 caliber Colt Browning. (*U.S. Army*)



Automatic Colt Pistol

Calibre 38-Rimless Smokeless.





Component Parts Automatic Colt Pistol

Calibre 38 Rimless Smokeless.

would lead to accidental shootings, especially by inexperienced troopers. Seven officers stressed the need for a mechanical safety to lock the cocked hammer. A few officers believed that self-loading pistols were suitable only for officers and senior noncommissioned officers.

Other negative comments about the Model 1900 Colt Browning covered the pistol's tendency to be muzzle heavy and poorly balanced (mentioned in 17 reports), its failures to eject empty cartridge cases when the pistol was dirty (mentioned in 14 reports), the caliber's inadequacy (mentioned in 12 reports), the shortness of the grip (also mentioned in 12 reports) and its smoothness (mentioned in 7 reports), and the pistol's overall awkwardness and poor angle (mentioned in 4 reports). Four officers also thought the front sight was too high, and three remarked that it was impossible to tell at a glance if the chamber was loaded. Only four officers thought the pistol's mechanism was too complicated, and only three considered the 1900 less accurate than the service revolver.[2] Despite the obvious need for improvements in the Model 1900, this pistol got a much better reception from American military users than the 1000 Model 1900 Borchardt-Luger pistols that were also being tested at this time (1902–1903).

One of the key problems and the subject of much criticism, with the Model 1900 was its combination rear sight and firing pin safety. This mechanism consisted of four small components that were delicate and very hard to operate with only one hand. During 1901, Model 1900 pistols with serial numbers 1701 through 3000 could be found with either the original rear sight safety or a new type of sight and no safety (not an acceptable solution to the difficulty).

While the U.S. Army experimented with the Model 1900 pistols it purchased in 1901, Colt started to produce a variety of "Commercial" and "Military Models" for public sale. Since these variations are discussed at length in Donald Bady's classic work *Colt Automatic Pistols*, their differences are described here only in tabular form. The total number of Model 1900 pistols manufactured from 1900 to 1903 was about 3,500. About 7,500 Model 1902 sporting versions were made from 1903 to 1907, and about 18,000 military models were built from 1902 to 1927. The slide lock of the .38 1902 Military Model was a useful addition because it held the slide open after the last shot had been fired. The shooter knew instantly that his weapon was empty. It was easier to recharge the pistol once the loaded magazine had been inserted. When the last cartridge had been fired, the magazine follower pushed the slide lock upwards to prevent the slide from going forward.

The 1902 Military Model also had a longer and more squared-off butt so that the magazine could carry eight cartridges. Lieutenant Lawson M. Fuller's complaint, which was shared by others, regarding the short grip and the pistol's poor balance had been taken to heart by Browning and the Colt engineers. As few changes as possible were made to the Model 1900 so that existing jigs, fixtures, and tools could be used. Military Model 1902 Colt Browning pistols were tested by British officials in 1903 (found to be unacceptable because the caliber was smaller than .40 [10.16mm]), by the Swedish in 1903, and by the Norwegians in 1904.

Early in 1903, Colt considered developing a .41 caliber (10.41mm) version of the Model 1902 Military to meet British and American complaints about the inadequacy of the .38 caliber (9mm) cartridge. Apparently this was a short-lived project for two good reasons. First, the .38 caliber Colt Browning locking links were subject to failure when firing the .41

TABLE 6-3 VARIANTS OF THE .38 COLT MODEL 1900 PISTOL

Model	*Serial Numbers*	*Distinguishing Characteristics*
.38 1900 Army Contract	**11,12,59,60,87–183**	**Standard Model 1900.**
.38 1900 Navy Contract	**USN1–USN250 Colt 1001–1250**	**Standard Model 1900.**
.38 1901 Army Contract	**1501–1700**	**Cocking serrations located on the muzzle end of the slide; checkered wooden grips.**
.38 1900 Commercial Model	**ca. 4000–5000**	**Hard rubber grips with Colt's logo (ca. early 1902); those with rounded hammers called Sporting Model after Dec. 1902.**
.38 1900 Sporting Model	**5000–10,999 30,000–30,190**	**See 1900 Commercial Model above (model dropped in 1907).**
.38 1902 Military Model	**11,000–15,000 (1905–1906) ca. 31,000–43,266**	**Introduced at end of 1901, with commercial sales beginning in the fall of 1902 (slide lock patented 9 Sept. 1902, U.S. patent 708,794). Production was interrupted by World War I and terminated in 1927.**
.38 1902 Army Contract	**15,001–15,200**	**Same as 1902 Military Model.**
.38 1902 Military Model	**at ca. 34,000**	**Sear-type hammer introduced in about 1908.**
.38 Pocket Model	**16,001–20,000 (1903–1908) 20,001–29,999 30,191–30,999 31,000–43,266 (intermixed with 1902 Military) 43,266–47,226**	**Barrel shortened to 114mm rather than 152mm, with frame and slide shortened accordingly. Introduced in about late 1903. Total production 1903 to 1927 was about 22,000.**

FIGURE 6–13. A commercial version of the Colt Browning .38 caliber Model 1900 pistol. This example (serial number 1936) has a rear sight safety, which when pushed down blocked the firing pin. (*National Defense*)

FIGURE 6–14. Another commerical model of the Colt Browning 1900. This one does not have the rear sight safety. (*Hogg & Weeks*)

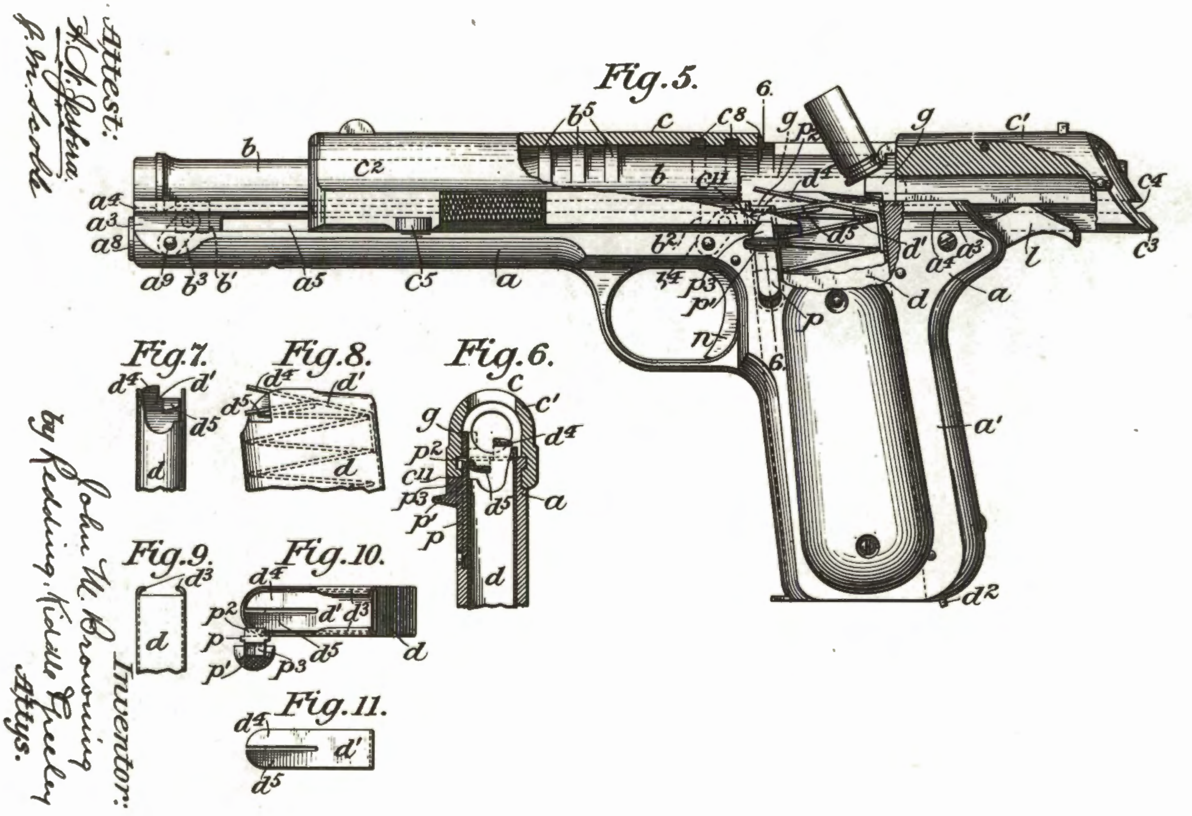


FIGURE 6–15. The .38 caliber Colt Browning Model 1902 (Military Model), which incorporated the new slide hold-open stop (U.S. patent 708,794). (*Smithsonian, U.S. Patent Office*)

FIGURE 6–16. The .38 caliber Colt Browing Military Model pistol with 1908-type hammer (serial number 39,695). (*Visser*)

caliber cartridge. This larger cartridge, derived from the .41 Long Colt revolver cartridge, probably stressed these parts more severely and created failures. Second, the Army was conducting wound ballistics tests that would produce data arguing for the adoption of a .45 caliber cartridge (11.43mm).[3]

THE CALIBER QUESTION

What is the best caliber for a pistol bullet? This was a question for which there were many opinions, but few reliable answers. By 1900, there was a general feeling that a projectile larger and more potent than that used in the .38 caliber (9.7mm) M1894 Colt New Model Army revolver was needed. Officers in the field reported through their commanders to the Ordnance Office that some improvement was necessary. In 1900, for example, an officer in Cuba noted:

> I consider the cal. 38 service revolver to have one very good merit: It's accuracy and range are satisfactory.
>
> The defects are: 1st: A great many delicate parts that are likely to become broken in a protracted campaign, and not easily replaced under such circumstances. Compare the ease with which the Mauser automatic pistol, firing ten shots, can be taken apart or assembled, and the strength and serviceability of it's several parts. 2nd: It's small caliber. Time after time I have seen it necessary to fire several shots in a horse's head, in order to bring him down, when the man was very close. The Cavalry Pistol should be of such caliber and power, that either horse or man hit will be out of the fight. It is not the wounding the enemy, that counts in a charge with pistols. To bring horse or man, especially the horse, down is the object.

Nearly everyone agreed with the observation that the .38 caliber was insufficient for the military, but the Ordnance Office staff believed that more scientific data were required to find a replacement cartridge. A board, comprised of Colonel John T. Thompson, Ordnance Corps (1860–1940), and Colonel Louis A. LaGarde, Medical Corps (d. 1927), was established in 1904 to conduct a series of tests with bullets of different size, weight, and other characteristics and then recommend a bullet with the desired short-range stopping power and shock effect. As Colonel LaGarde was to remark:

> For personal encounters in self defense, it is useless to carry anything but an effective weapon. At war with savage tribes or a fanatical enemy, a military man seeks to arm his soldiers with a rifle that delivers projectiles with telling effect. A fanatic like a Moro wielding a bolo in each hand who advances with leaps and bounds and who never knows when he is hit until he is shot down must be hit with a projectile having a maximum amount of stopping power. Again, the military man has to reckon upon the stopping power of projectiles against cavalry and artillery horses in a charge.

Encounters with Moro tribesmen in the Philippines had definitely indicated the need for increased stopping power. Again to quote Colonel LaGarde, who interviewed members of the Medical Corps on the islands:

> In 1907 a Moro charged the guard at Jolo, P.I. When he was within 100 yards, the entire guard opened fire on him. When he had reached within 5 yards of the firing party he stumbled and fell and while in the prone position a trumpeter killed him by shooting through the head with a .45-caliber Colt's revolver. There were ten wounds in his body from the service rifle. Three of the wounds were located in the chest, one in the abdomen and the remainder had taken effect in the extremities. There were no bones broken.

Colonels Thompson and LaGarde experimented with 10 different projectiles (see table 6–4), ranging in weight from 6 to 18.7 grams, in diameter from 7.65 to 12 millimeters, and in energy from 259 to 563 joules. The firing tests were conducted against 10 human cadavers, 16 steers, and 2 horses. Colonel Thompson did the shooting at the corpses, which were suspended by their necks. The impact of the projectiles on the free swinging bodies was used to evaluate their shock effect. After the shooting, Colonel LaGarde carried out the necessary dissections to examine the wounds. X-ray photography done by Doctors A. Hewson and W. M. Sweet of Philadelphia aided LaGarde in his analysis. Shooting took place at 0, 35, and 68.5 meters.

From their experiments on the cadavers at the Philadelphia Polyclinic, they drew the following conclusions. First, in skull wounds, the small, high-velocity, jacketed bullets had a more explosive effect than the larger, slower lead bullets. But in either case, the wounds would be fatal, whether the large, lead projectile lodged in the brain or the Parabellum projectile passed through it taking half the skull with it. Second, in all bony structures except the head, the fractures caused by the unjacketed, low-velocity, lead bullets were more serious than the clean perforations made by the Parabellum bullets. Third, based upon body oscillation, the large-caliber, blunt-nosed, lead bullets exerted a greater smashing power upon impact. These projectiles tended to stop in the body, while the higher-velocity, jacketed ones usually passed through. Finally, there was very little deformation of the bullet types, lead or jacketed, as a result of entering the human body.

Although the data gathered from these experiments tended to favor the large, unjacketed projectiles as man-stoppers, Thompson and LaGarde also wanted to shoot at living tissue to determine the effects of the ten projectiles. For this phase of the investigation, they went to the Nelson Morris slaughterhouse at the Chicago Stockyards. An army sergeant who was an expert pistol shot was assigned the duty of shooting at steers in their lung and intestinal cavities. None of the steers appeared to be seriously affected by the 7.65mm or 9mm Parabellum rounds. After ten shots from each, the steer would still be standing and apparently unaffected. The .38 caliber Colt cartridges (jacketed and unjacketed) had greater effect. Four or five shots from the .45 caliber Colt revolver brought the animal down, while with the .455 and .476 projectiles three or four shots were required. These large bullets caused the animals to hemorrhage, as well. LaGarde commented on these tests.

> The failure on the part of the automatic pistols of small caliber set at rest at once the claims of the makers to the effect that the superior energy and velocity of their weapons was a controlling factor in stopping power. The Board was of the opinion that a bullet which will have the shock effect and stopping power at short ranges necessary for a military pistol or revolver should have a caliber not less than .45. The tests showed that the .476-

TABLE 6-4. BULLETS TESTED BY THOMPSON-LAGARD WOUND BALLISTICS BOARD, 1904*

Make	Model	Caliber	Magazine Capacity	Powder Charge: Weight in Grams (Grains)	Powder Charge: Type	Weight in Grams (Grains)	Bullet Type	Shape of Point	Velocity in m/s (f/s): Muzzle	Velocity in m/s (f/s): 35 meters	Velocity in m/s (f/s): 68.5 meters	Energy in Joules (foot pounds)
1. Luger Parabellum	120mm Barrel	7.65mm (.3012)	8	.40 (6.2)	Smokeless	6.0 (92.6)	Jacketed	Truncated Cone	433 (1420)	383 (1258)	345 (1133)	563 (415)
2. Luger Parabellum	100mm Barrel	9mm (.3543)	8	.34 (5.2)	Smokeless	7.9 (123)	Jacketed	Truncated Cone	319 (1048)	300 (985)	283 (930)	408 (301)
3. Colt Revolver	Army 1903	9mm (.38)	6	.21 (3.3)	Bull's Eye	9.6 (148)	Lead	Spherical Segment	233 (763)	222 (727)	210 (690)	259 (191)
4. Colt Automatic Pistol	Military 1902	9mm (.38)	8	.43 (6.6)	Smokeless	8.4 (130)	Jacketed	Spherical Segment	337 (1107)	311 (1022)	290 (953)	480 (354)
5. Colt Automatic Pistol	Military 1902	9mm (.38)	8	.42 (6.5)	Smokeless	7.8 (120)	Softnose	Spherical Segment	319 (1048)	299 (980)	280 (920)	397 (293)
6. Colt Revolver	New Service	11.43mm (.45)	6	.31 (4.8)	Bull's Eye	16.2 (250)	Lead	Blunt Point	219 (720)	211 (692)	204 (668)	390 (288)
7. Colt Revolver	New Service	11.43mm (.45)	6	.31 (4.8)	Bull's Eye	14.3 (220)	Lead	Hollow Point	213 (700)	211 (691)	208 (683)	324 (239)
8. Colt Revolver	New Service	11.55mm (.455)	6	.41 (6.4)	Cordite	14.2 (218.5)	Soft Lead	Cupped Point	244 (801)	215 (704)	188 (616)	390 (288)
9. Colt Revolver	New Service	12.09mm (.476)	6	1.17 (18)	Black	18.7 (288)	Lead	Spherical Segment	222 (729)	209 (686)	197 (646)	461 (340)
10. Colt Revolver	New Service	12.09mm (.476)	6	1.17 (18)	Black	18.7 (288)	Lead Explosive	Spherical Segment	222 (729)	209 (686)	197 (646)	461 (340)

*Adapted from LaGarde, *Gunshot Injuries*, pp. 72–73.

> caliber lead bullet has the greatest stopping power. Its weight is 288.1 grains, muzzle velocity 729 f.s.; muzzle energy 430 foot-pounds. The .45-caliber lead bullet slightly blunt point was next in stopping power. It weighs 250 grains with a muzzle velocity of 720 f.s. and muzzle energy of 288 foot-pounds. A slightly blunt point has the advantage of making a bullet bite better in striking a hard bone at an angle, or in clipping the edge of a vessel. All things considered such a bullet is best suited for the military service in close combat. The Board considered that cup-pointed bullets such as the "man stopper" might be issued to troops fighting savage tribes, and fanatics in the brush or jungle. This bullet showed great execution on live animals. It weighs 218.5 grains. It has a muzzle velocity of 801 f.s. and a muzzle energy of 288 foot-pounds. The edge of the cup readily mushrooms upon striking cartilage and joint ends of bones, thereby adding to the sectional area and stopping power.
>
> None of the full-jacketed . . . (all of which were less than cal. .45) showed the necessary shock effect or stopping power for a service weapon. They failed especially in the joint ends of bones and non-vital parts which comprise the larger part of the target area presented by the human or animal body. In the event that an automatic pistol should eventually be adopted by the government it was recommended that the caliber should not be less than .45, and that the point of the jacket should be made very thin and that the lead core be made of softer lead than that of any of the bullets tested. The object of this was to invite mushrooming. We were well aware that this recommendation would not be adopted because the comity of nations frowns upon any device which is calculated to increase the severity of wounds in war.

From all of their experiments, Thompson and LaGarde concluded that the shock power of a bullet is always proportional to (1) the cross-sectional area of the projectile, (2) the resistance of the target on impact, and (3) the amount of tissue destroyed. They also determined that:

> A full-jacketed bullet which makes a clean fracture in bone, and then leaves the body, takes the greater part of its energy in flight. When the bone is very resistant or the jacket is marred, the bullet may disintegrate. Its sectional area is then increased, and it leaves its energy in the body in proportion to the amount of metal which it deposits in the foyer of fracture. When it lodges entirely, it parts with all of its remaining energy.

Thus, militarily, the best projectile was one that entered the target and stopped; the .45 caliber (11.43mm) bullet met this criterion. It weighed between 12.96 and 14.90 grams, with an initial velocity of about 245 meters per second.[4]

THE .45 CALIBER MODEL 1905 COLT BROWNING PISTOL

Early in 1905, the technical staff of Colt had successfully tested a .45 caliber self-loading pistol patterned after the .38 caliber (9mm) 1902 Military Model but enlarged to take the increased size of the cartridge. Getting an acceptable prototype .45 pistol took some work. The first one, created in 1904, had been unsatisfactory for three reasons. The projectile, at 15.23 grams, was too heavy to get the desired velocity and accuracy. The cartridge case, a modified .45 caliber Long Colt case with an extraction cannelure (that is, rimless) in place of a rim, was too long for satisfactory operation. And finally, despite enlargement of the locking links and their pins, these components were still too weak.

Before proceeding with further development of the handgun, Colt and Winchester specialists set about improving the cartridge. They shortened the case from about 30 millimeters to about 23 millimeters and reduced the weight of the projectile from 15.23 grams to 12.96 grams. From this cartridge, they were able to obtain an initial velocity of 260 meters per second and acceptable accuracy at 45 meters. By the spring of 1905, Winchester was at work producing quantities of this experimental ammunition for use in the improved .45 caliber pistol.

The improved .45 Colt Browning pistol had a stronger frame and slide, and the frame, slide, and barrel had all been shortened. John Browning also worked on a series of different methods for making the link-type locking system more rugged. He took at least four different approaches to solving this problem, and these experiments led the designer to abandon the two-link system in favor of the single rear-link system. The shift to a single-link operation was still several years in the future, however, and Colt decided in mid-1905 that it would be advantageous to get on with the production of a .45 caliber military automatic handgun. There was already a commercial demand for such a weapon, and Colt officials were anxious to offer the army a production pistol. Manufacture of the Model 1905 Military Pistol began in September or October 1905, and one of these new pistols was shot in trials at the Royal Small Arms Factory at Enfield in November 1905. With the exception of minor changes in the slide markings, the introduction of a spur-type hammer in 1908, and about 150 pistols that were fitted with detachable shoulder stock-holsters, there was little difference between the first Model 1905 pistols manufactured in 1905 and the last ones

TABLE 6-5 SLIDE MARKINGS ON COLT MODEL 1905 PISTOLS

Serial Number Range	*Markings on Left Side of Slide*
1–ca. 500	**BROWNING'S PATENT APR. 20. 1897 SEPT. 9. 1902**
	COLT'S PATENT FIRE ARMS MFG. CO. HARTFORD, CONN. U.S.A.
ca. 500–700 (about Dec. 1905)	**PATENTED APR. 20 1897 SEPT. 9 1902**
	COLT'S PF. F.A. MFG. CO. HARTFORD. CT. U.S.A.
ca. 700–3600 (about Jan.–Feb. 1906)	**PATENTED APR. 20. 1897. SEPT. 9. 1902. DEC. 19. 1905**
	COLT'S PATENT FIRE ARMS MFG. CO. HARTFORD. CONN. U.S.A.
ca. 3600–6000 (about 1908–1909)	**PATENTED APR. 20. 1897. SEPT. 9. 1902. DEC. 19. 1905**
	COLT'S PT. F.A. MFG. CO. HARTFORD, CT. U.S.A.

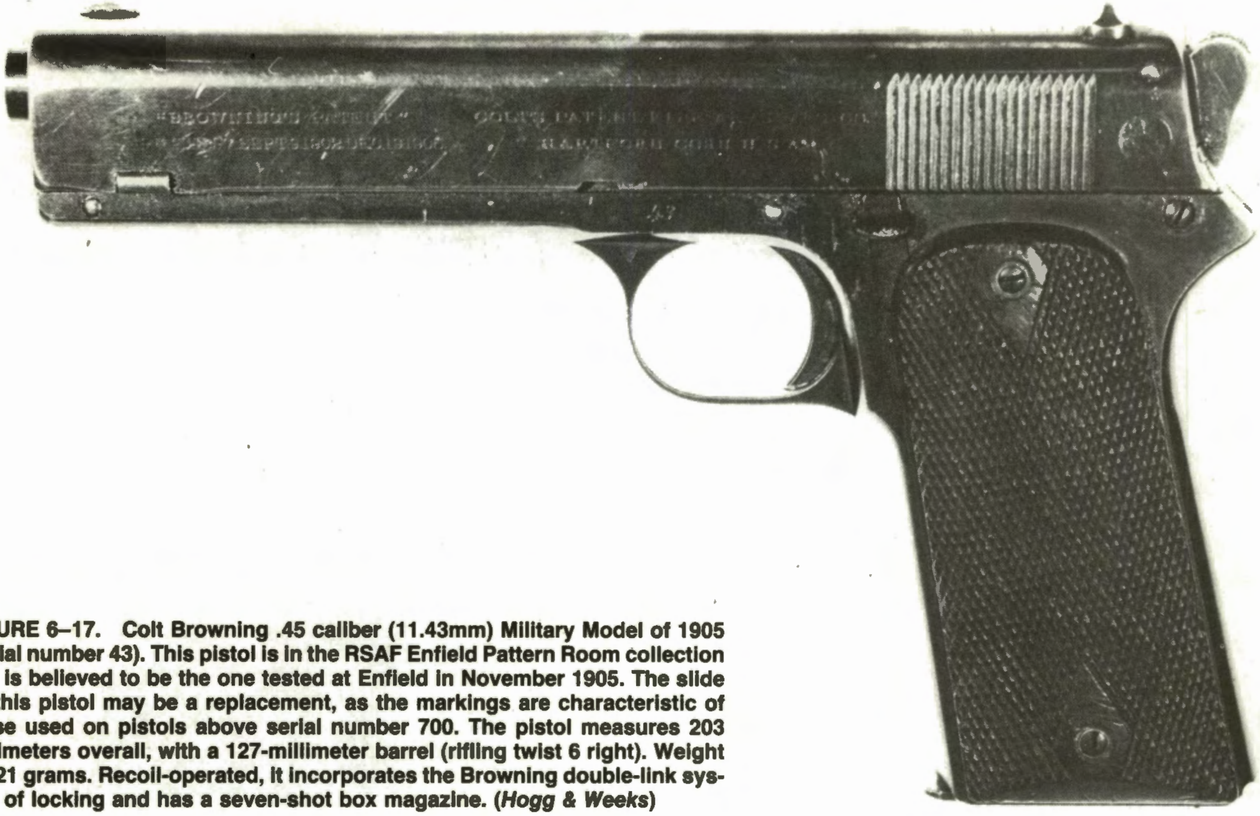


FIGURE 6–17. Colt Browning .45 caliber (11.43mm) Military Model of 1905 (serial number 43). This pistol is in the RSAF Enfield Pattern Room collection and is believed to be the one tested at Enfield in November 1905. The slide on this pistol may be a replacement, as the markings are characteristic of those used on pistols above serial number 700. The pistol measures 203 millimeters overall, with a 127-millimeter barrel (rifling twist 6 right). Weight is 921 grams. Recoil-operated, it incorporates the Browning double-link system of locking and has a seven-shot box magazine. (*Hogg & Weeks*)

FIGURE 6–18. A .45 caliber (11.43mm) commericial version of the Colt Browning Military Model, circa 1905 (serial number 320). Although this model has a slide lock and inertia-type firing pin, it was not equipped with any mechanical safeties. (*National Defense*)

FIGURE 6–19. Colt Browning .45 caliber Military Model of 1905 (serial number 2313). (*U.S. Army*)

FIGURE 6–20. A special model of the .45 caliber (11.43mm) Colt Browning pistol was built for the U.S. Army in 1906 and 1907. It has a grip safety. From 1908 to 1910, 200 of these pistols with a spur-type hammer were tested in the field. This example is serial number 87. (*National Defense*)

produced in 1911. In total, 6,100 were manufactured for commercial sale, and 201 were made for the 1908–1910 U.S. Army trials. These test pistols cleared the way for the Colt pistol that was adopted by the army in 1911.[5]

PISTOL AND REVOLVER TRIALS

Starting on 31 January 1906, Brigadier General William Crozier (1855–1942) sent form letters to inventors, manufacturers, and representatives informing them that the U.S. Army planned to conduct tests of .45 caliber (11.43mm) revolvers and self-loading pistols to determine the "type of calibre .45 arm best suited for adoption for use principally by the cavalry and light artillery." During the following weeks, some twenty addressees were invited to submit such handguns as they might desire, "the only restriction placed upon their design being that they shall use the cartridge to be furnished by this Department for the test." Crozier informed the prospective participants that:

> The Ordnance Department will furnish at its own expense all cartridges . . . required in the test of all arms in the competition. Should inventors desire to procure in limited quantities these cartridges for making preliminary tests of the arms which they intend to submit for test, they will be sold by the Department at $2.86 per hundred. . . .
>
> The competitive test will be conducted by a Board of Officers of the United States Army that will be convened by the War Department to meet at the Springfield Armory, Springfield, Massachusetts, U.S.A., on September 12, 1906. All arms submitted for test must therefore be delivered to the Commanding Officer, Springfield Armory . . . not later than 12 o'clock, noon, September 11, 1906. . . . Both revolvers and automatic pistols will be tested; any inventory is at liberty to submit arms of both classes and more than one arm of either class.

Crozier also asked his correspondents to note that the only differences in the test cartridges for revolvers and automatic pistols was that those for revolvers had a rimmed shell and those for automatics had a cannelured shell. The bullet weighed 14.9 grams and with a charge of smokeless powder of approximately .34 gram gave an automatic pistol projectile a muzzle velocity of 243 meters per second.[6]

The starting date for the tests was slipped several times. In mid-July, letters were sent telling nineteen prospective participants that the trials had been delayed from 12 September 1906 until 29 October because of the "probable absence of Troops at the Manoeuvers until 15 October 1906." In October, the tests were postponed again, this time because of requests from Georg Luger at DWM and other inventors

FIGURE 6–21. General William Crozier (1855–1942) was chief of ordnance from 1901 until 1918. (*U.S. Army*)

for more time to deliver their pistols. At the end of November, the 3 December starting date was delayed until 15 January 1907. The board of Officers for testing of revolvers and automatic pistols was convened for preliminary organizational activities on 28 December and then temporarily adjourned on 26 January because the Savage, White-Merrill, Ross, and Bergmann pistols had still not been delivered. Reconvened on 20 March, the Board completed its work by the 28th. The members of this group were Colonel Philip Read, 23d Infantry, president of the board; Major Joseph T. Dickman, 13th Cavalry; Captain Guy H. Preston, 13th Cavalry; Captain William M. Cruikshank, Artillery Corps; Captain John H. Rice, Ordnance Department, recorder.

The Ordnance Department received responses from eighteen parties interested in submitting handguns for trial, but only nine pistols were actually delivered.* The 1907 trials have generally been viewed out of context, due in large part to the fact that the Ordnance Department published the results, both as a separate publication and as an appendix to the *Annual Report of the Chief of Ordnance for 1907.* Many writers have siezed upon this document because of its ready accessibility, but the 1907 report was only one of a series covering trials that extended from 1907 to 1911. Basically, the 1907 trials were significant because they narrowed the field of competing handguns. Colt's .45 caliber 11.43mm pistol was not a clear winner, but it showed promise, as did a pistol submitted by Savage. The board was of the opinion that these two handguns possessed "sufficient merit to warrant their being given further test under service conditions." The board report went on:

> Among the most desirable features of the Savage pistol are its simplicity and small number of parts and their accessibility, the lack of screws or flat springs, the number of cartridges (eight) held by the magazine, the position of the center of gravity and the way the pistol lies in the hand, the expulsion of the magazine by the pistol hand, and the ease with which the breech mechanism may be withdrawn. Among the most desirable features of the Colt pistol are its flatness, compactness, neatness, and ease of carrying, the comparatively short total length, and the ease with which the breech mechanism may be withdrawn.[7]

The testing officers noted that both candidate pistols required some important changes to improve them. Both were faulted for having inadequate safety mechanisms. The Savage could be improved by the use of wooden grips instead of metal ones, and the front sight could be improved and more securely fastened. The Colt trigger needed improvement, as did the hammer spur. A more convenient magazine release was also desirable.

*In order to simplify the story of the tests, all of the prospective entrants are listed in table 6–6 with the test results. Illustrations of representative experimental pistols tested by the U.S. Army in 1900 to 1918 are grouped together at the end of this chapter.

TABLE 6-6 HANDGUN PROPOSALS FOR 1906–1907 TRIALS

Manufacturer	*Designer*	*Sales representative*	*Model*	*Results*
Colt Patent Firearms Manufacturing Company, Hartford, CT	**John M. Browning**	**None**	**.45 Military Model**	**This pistol, with changes, was recommended for additional testing.**
Colt Patent Firearms Manufacturing Company	**Colt technical staff**	**None**	**.45 double-action revolver**	**Recommended as an interim .45 caliber weapon, pending the perfection of a self-loading pistol.**
Savage Arms Company, Utica, NY	**E.H. Searle**	**None**	**.45 Military Model**	**This pistol, with changes, was recommended for additional testing.**

TABLE 6-6 HANDGUN PROPOSALS FOR 1906–1907 TRIALS *Continued*

Manufacturer	*Designer*	*Sales representative*	*Model*	*Results*
Smith & Wesson, Springfield, MA	S&W technical staff	None	.45 double-action revolver	Not recommended for further development because the army was already familiar with the Colt revolvers.
Deutsche Waffenund Munitionsfabriken, Berlin, Germany	Georg Luger	Hans Tauscher	.45 Parabellum	Not recommended for further development because the propellant required for the cartridge was not readily available in the U.S.
White Merrill Arms Company, Boston, MA	Samuel Merrill & J. Chester White	None	.45 self-loader	Rejected because it was still in a very primitive state of development.
William B. Knoble, Takoma, WA	W.B. Knoble	None	.45 self-loader	Rejected because both the single-action and double-action prototypes were too crudely made to function properly.
Bergmanns Industriewerke, Gaggenau, Germany	Theodor Bergmann & Louis Schmeisser	A.E. Piorkowski, Germany	.45 version of 1903 Mars pistol	Rejected because it did not function properly.
Webley & Scott, Birmingham, England	G.V. Fosbery	J. Devlin, Stafford, England & Charles Daly, NYC	.455 Webley-Fosbery Automatic revolver	Rejected because it was too large, cumbersome, and did not offer any significant advantage over regular revolvers.
Österreichische Waffenfabrik Gesellschaft, Steyr, Austria	Unknown	Robertson Honey, NYC	Unknown	Proposed to submit a .45 caliber pistol, but did not.
Waffenfabrik Mauser, Oberndorf, Germany	Unknown	Von Lengerke & Detmold, NYC	.45 Mauser pistol	Pistol developed, but was not submitted during the 1906 to 1907 period.
Fegyver és Gépgyár R.T. Budapest, Hungary	Unknown	None	Unknown	Pistol not submitted after it was decided that project would be too costly.
Ross Rifle Company Quebec, Canada	Sir Charles Ross	None	.45 toggle action	No pistol submitted; prototype never completed.
Captain George Vidmer, Des Moines, IA	G. Vidmer	None	Unknown	No pistol submitted.
Littell and Company, England	Bernhard Müller	Lunham & Moore, NYC	.45 Müller self-loader	A 7.65mm Parabellum pistol was tested in 1905, but the proposed .45 caliber version was not submitted in 1906–1907.
W.D. Condit, Philadelphia, PA	W.D. Condit	None	Unknown	No pistol submitted.
C.W. Louis, Winsor, VT	C.W. Louis	None	Unknown	No pistol submitted
Harrington & Richardson, Worcester, MA	Unknown	None	Unknown	No pistol submitted
Colonel G. Vitali, Italy	G. Vitali	None	Unknown	No pistol submitted

All the other candidate pistols were rejected as being not sufficiently reliable. Georg Luger's .45 caliber (11.43mm) version of his Parabellum pistol was third in the overall rankings, but it was not recommended for service test because it did not perform reliably, even with the cartridges supplied by Luger and DWM. The locking of the toggle was not always complete, and the propellant powder recommended by Luger was not readily available in the United States.

The board recommended field trials for the Colt and the Savage since tests at Springfield Armory, no matter how severe, could not duplicate the punishment pistols would get in the hands of troops. The board told General Crozier, chief of ordnance:

> The most vital question to be determined concerning automatic pistols in their present state of development is that of reliability of function, which should be equal to or closely approximate that of the revolver. For this purpose it is believed that the pistols and ammunition should be actually issued to a limited number of units, in substitution for and to the exclusion of their revolvers, with instructions to use them, carry them, and conduct target practice with them precisely in the manner previously prescribed for revolvers. In the target practice course, a complete record should be kept of all malfunctions, misfires, and jams, and of the repairs necessary to keep the weapon in serviceable condition; a similar record should be kept by some troops at the same posts equipped with caliber .45 revolvers. If the troop commanders designated to conduct these service tests be selected with care, a comparison of reports should show whether automatic pistols of the best type are sufficiently reliable for general adoption, the decision being based upon data which have not previously been developed in our own or other armies so far as known.[8]

Given the delay involved in self-loading pistol testing by the troops, the board thought it would be desirable to purchase a quantity of .45 caliber Colt revolvers for issue as an interim weapon to soldiers in the Philippines. In summary, the Board's recommendations read as follows:

1. That sufficient Colt double-action revolvers, caliber .45, be issued to arm the troops in the Philippines as soon as practicable.
2. That sufficient Colt automatic pistols, caliber .45, to arm completely three troops of cavalry be obtained and issued for a service test of not less than one year.
3. That sufficient Savage automatic pistols, caliber .45, to arm completely three troops of cavalry be obtained and issued for a service test of not less than one year.
4. That one troop of cavalry stationed at each of the posts to which the automatic pistols may be assigned be armed completely with Colt double-action revolvers, caliber .45, for a period of not less than one year.
5. That the pistols and revolvers so issued be used to the exclusion of the present weapon, which should be turned in.
6. That the troop commanders to whose organizations the pistols and revolvers referred to above may be issued be carefully chosen for their interest in the selection of a proper weapon.

FIGURE 6–22. Two models of the Colt Model 1878 Double-Action revolver. The *top* one is the type that was issued to the Philippine Constabulary. *Below* is the standard commercial model. (*Colt*)

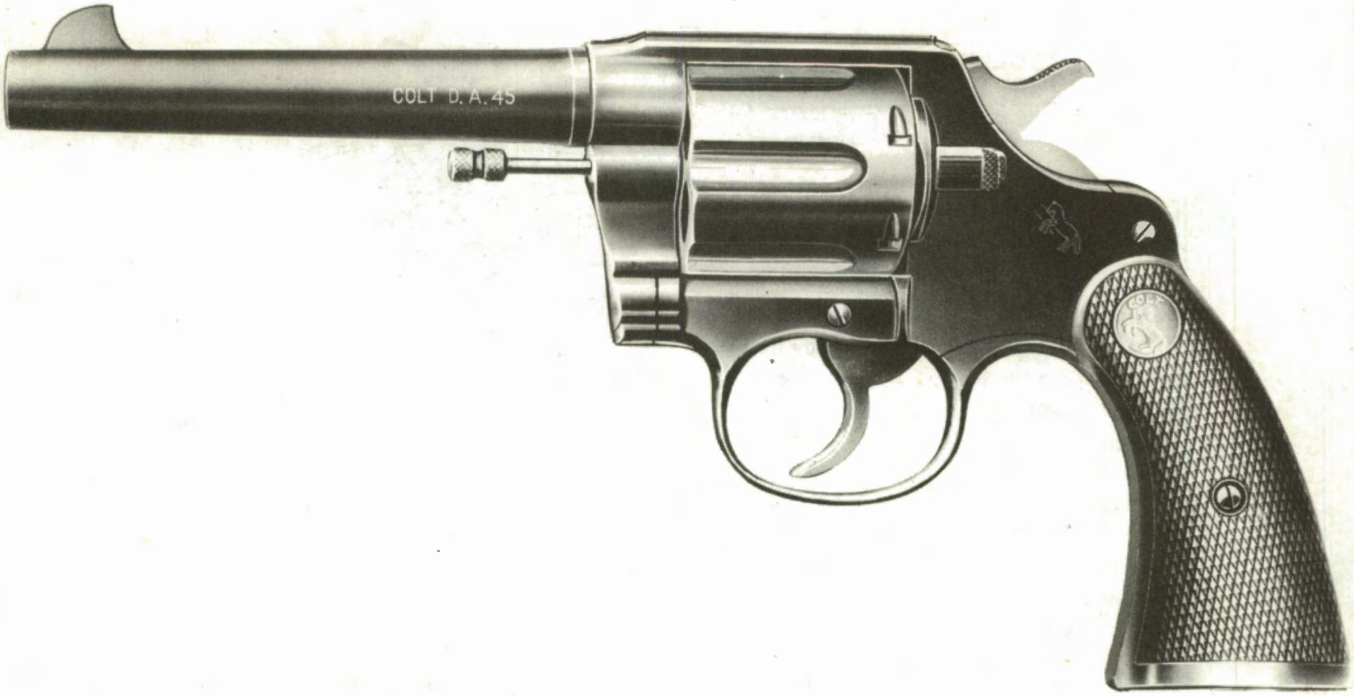


FIGURE 6–23. A commercial version of the Colt New Service revolver. The Military Model of 1909 had walnut grips with a lanyard swivel. (*Colt*)

7. That these pistols and revolvers be used in all respects as are the present revolvers in drills, target practice, maneuvers, etc., and that a complete and detailed record be kept of all misfires, malfunctions, and jams, and of the repairs necessary to keep the arms in a serviceable condition.
8. That at the end of one year after date of issue complete and detailed reports be submitted by the respective troop commanders to The Adjutant-General.[9]

The chief of ordnance endorsed the recommendations, and the wheels were set in motion to purchase 200 each of improved versions of the Colt and Savage pistols and a sufficient quantity of Colt Double-Action revolvers to arm American troops in the Philippines.

Interim Measures

The 1907 Board of Officers recommended that the .45 Colt Double-Actions be sent to the Philippines "as soon as practicable." As already noted, the stopping power of the .38 caliber New Army series revolvers was not sufficient for the combat conditions in the Philippines. In the search for a more effective handgun, several small quantities of Model 1873 Single-Action Army revolvers had been shipped to Manila at the turn of the century (500 in 1901, for example). The Philippine Constabulary, a colonial police force established on 18 July 1901, had purchased Colt's Model 1878 Double-Action revolver, which fired the same cartridge as the Model 1873. An August 1901 cablegram from the civil governor of the islands to the chief of ordnance requested "5,000 Colt's Double Action, cal. .45, Revolvers, latest model, 6" barrel, rubber stock, rounded butt, with swivel, with customary appendages."* By 31 December 1902, the last of these revolvers had been loaded on a ship bound for Manila. There was indeed a variety of hardware on the Philippine islands, most of it of Colt manufacture.[10]

These old model double-action Colt revolvers were not very durable, so Colt's technical staff had created a .45 caliber revolver based on the basic design of the New Model Army (1892 series). These revolvers, introduced first in 1893, were chambered to fire the British .455 *New Service* ammunition (Cordite Mark I). To handle the more powerful smokeless propellant charges, the New Service revolvers had a larger and more robust frame. In 1905 at about serial number 21,000, Colt engineers introduced the "improved model" New Service revolver, which embodied several mechanical improvements. The flat springs for the cylinder bolt and hammer strap strut were replaced by coil springs. A pivoted firing pin, first used on the New Service Target Model, was added, and the ejector rod head was enlarged and knurled, with the dismounting hole being eliminated. But most important, Colt incorporated the "Colt Positive Lock" safety mechanism into the design of the New Service's lock work. This additional safety was created to prevent forward movement in the event that a severe blow to the uncocked hammer damaged the rebounding safety lever. This new feature also kept the cylinder lock from moving to the rear. When uncocked, the hammer-mounted firing pin was kept from hitting the cartridge primer; when the pistol was cocked the cylinder could not be opened. The "Positive Lock" made a safe revolver even more foolproof.

On 17 December 1908, the Ordnance Department ordered 6,000 of these Colt double-action revolvers, caliber .45 (11.43 × 32mmR), with 140-millimeter barrels at a unit

*Philippine Constabulary Colts are identified by their large trigger guards and elongated triggers.

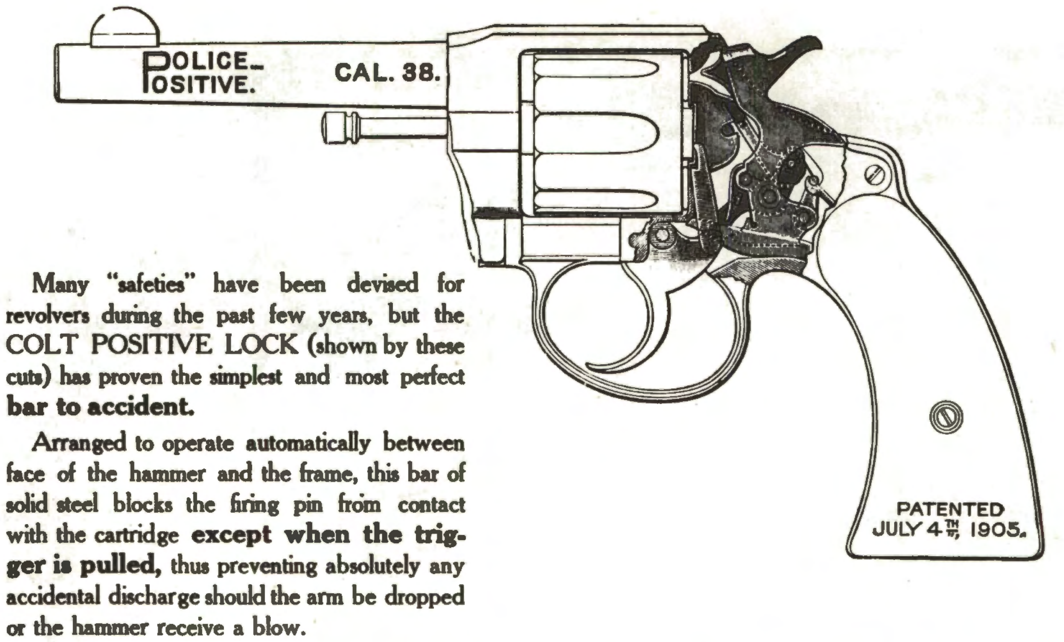


FIGURE 6–24. An illustration from an early twentieth century Colt catalog showing the *Positive Lock* as incorporated in the Police Positive .38 caliber revolver. (*Colt*)

price of $13. The formal contract was executed on 10 February 1909. The new cartridge was slightly longer (by about .36mm) than the Model 1873 Single-Action Army cartridge and had a larger rim to prevent it from being used in the older revolver. While the Model 1873 cartridge had a 14.9-gram projectile with a muzzle velocity of 233 meters per second, the new smokeless powder cartridge had a 16.2-gram bullet that traveled at 219 meters per second. The new pistol and cartridge were designated the Model 1909.[11] Since the basic pistol was already in production, Colt was able to begin deliveries in May 1909. The total lot of 6,000 pistols had been shipped to Manila by February 1910. In 1909, the army ordered an additional 12,303 Model 1909 revolvers. In addition, the Marine Corps pruchased 1,200 and the navy 1,000, for a total military procurement of 18,303.

As good, reliable, and durable as the Model 1909 New Service was, it was only an interim solution. The future lay with the self-loading pistol.

Savage Self-Loader

From the beginning, it was a battle between David and Goliath—between Savage, the small and relatively young manufacturer and Colt, the well-established giant. Colt had the resources, technical and financial, to enter into a lengthy competition; Savage, as it would turn out, did not. The Savage self-loading pistol was the work of Elbert Hamilton Searle of Philadelphia. Searle's early experiments appear to have been supported in part by William D. Condits of Des Moines, Iowa. Searle and Savage produced their first .45 caliber (11.43mm) self-loaders just in time for the often-postponed 1907 trials. As already noted, waiting for the Savage pistols was one of several reasons for the delays.

The Searle-Savage pistol had a breech-block with locking lugs that mated with those in the barrel. At the instant of firing, the barrel and block were locked together. As the block attempted to recoil, the fixed-position locking lugs on the block forced the barrel to rotate through about three degrees, at which time the unlocked block was free to travel rearward by itself. Searle attempted to retard the counterclockwise rotation of the barrel by having the rifling spin the bullet clockwise. He only partially succeeded. The barrel and breech-block were actually unlocked before the bullet exited the barrel. The Searle-Savage pistol was also interesting because it used a striker-type firing mechanism instead of a hammer and firing pin system like the .45 caliber Browning design. What appeared to be a hammer on the Searle-Savage was actually a cocking device, the function of which is illustrated in the patent drawings (fig. 6–29).

For the 1907 trials, Savage built only a small number of pistols; but the 200 required for the field trials were more of a task. At first, the company turned down the Ordnance Department's request for 200 pistols because they were short on financial resources. (1907 was a year of economic depression.) Ordnance Chief Crozier tried to convince DWM to supply 200 .45 caliber Parabellum pistols as a substitute, but the German firm, too, decided not to risk the money required to build such a small lot. After some soul-searching and possibly the location of some funds, the Savage Arms Company agreed in August 1907 to build the 200 self-loading pistols at $65.00 each with two spare magazines. This was a substantial unit cost, considering that the Colt Model 1909 revolver was selling at $13.00 and the Model 1900 Colt self-loader at $20.00.[12]

From the outset, Savage's contract was beset with problems. The $65.00 price for each handgun did not defray the actual cost of the pistols. Savage managers (Benjamin Adriance, company president, J. DePeyster Lynch, secretary-treasurer, and Carleton L. Wood, assistant treasurer) carried

FIGURE 6–25. ***Top,*** **the Savage .45 caliber (11.43mm) military pistol and (*bottom*) the Model 1917 .380 Browning caliber Savage pistol. (*Glaze*)**

FIGURE 6–26. The Savage .45 caliber (11.43mm) military pistol. (*Glaze*)

FIGURE 6–27. A comparative view of the Model 1907 Savage .45 caliber (11.43mm) pistol and the Colt Browning M1911A1 pistol. (*Glaze*)

on a long and sometimes unhappy correspondence with the government. Savage had built a far smaller number of .45 caliber self-loaders than Colt had and was still sorting out the elements of its basic design. One of the key problems was getting the pistols to fire the test ammunition, which was made by the Union Metallic Cartridge Company (UMC) of Bridgeport, Connecticut. Government specifications required the ammunition to have a projectile weighing 15 grams, with a muzzle velocity of 244 meters per second. Over the next several years, Savage would have trouble getting their pistols to function satisfactorily with the UMC cartridges. Colt had no such difficulties, but Savage's problems would keep UMC from receiving the final payment for their ammunition until 5 January 1909.

Savage had other troubles, as well. They lost important documents required to complete the contract negotiations. Then they found that if required to build guns with interchangeable assemblies, they would not be able to meet the November 1908 delivery date.[13] So they had to obtain a waiver that would allow them to submit pistols without interchangeable parts. William Green, then vice-president of Savage, wrote to General Crozier on 5 November 1908 apologizing for their slowness in completing the 200 pistols. By that time, only 65 handguns were ready for delivery. The last of the 200 were not in Springfield until 15 December 1908. Green explained that the Savage company had encountered difficulties:

> In the first place, the changes suggested by the Board of Officers necessitated our building a new model, in order to convince ourselves that the changes could be embodied in the mechanism. After this model was completed we were compelled to seek for suitable raw material for the various parts, and in fact, had to have dies made with which to forge the frames. Then came the tedious delay of manufacturing the pistols without the aid of special tool equipment, and later the necessity of providing suitable springs which would work in harmony with each other.

FIGURE 6–28. A disassembled view of the Model 1907 Savage military pistol. (*Glaze*)

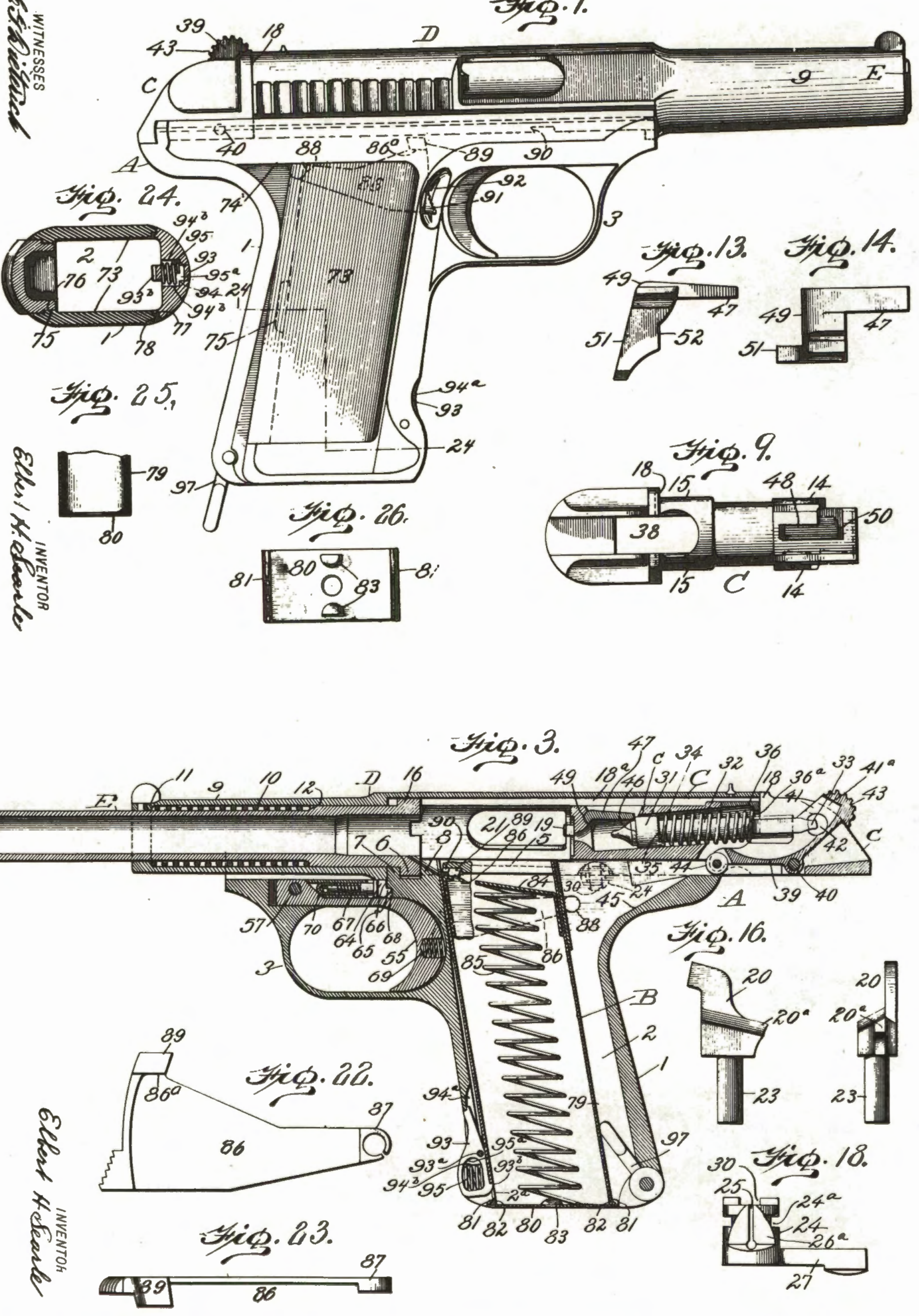


FIGURE 6–29. The .45 caliber (11.43mm) Searle-Savage military pistol, as illustrated in U.S. patent 936,369 of 12 October 1909. (*U.S. Patent Office*)

> In this, we were dependent upon others, with the result that we have been in endless correspondence and delay in procuring the various springs which met our requirements. The manufacturing operations all had to be carried on in our Tool Room, and at the same time, kept from conflicting with the regular work of the Tool Room. While the results are not as satisfactory as we would like to see, we nevertheless feel that you will agree with us that we have made a remarkable achievement in producing the pistols under all of the handicaps we have been experiencing. If, in the forthcoming tests, individual pistols develop shortcomings, we trust you will give them due allowance, bearing in mind the fact, that with proper working tools, we can in future get better results. In this connection, we would say that we have completed drawings for a set of manufacturing tools, and will shortly commence to make these tools with the object in view of putting the 45 calibre on the commercial market. When the tools are completed, we will be in a position to deliver perfect working pistols without delay, and at a substantial reduction in price.[14]

But the problems with the Savage pistol had only just begun. In January 1909, Major Kenneth Morton wrote to Savage telling them that their magazines were coming unlatched when the pistols were fired. In addition, the pistols would not reliably feed the ammunition. On 13 January, 72 slightly defective guns were shipped back to Savage for repairs. Reports from the field were distressing. The bolt hold-open device was often activated while the magazine still had cartridges in it. Feed problems were numerous. Magazines were difficult to reload, insert, and remove.[15]

Some of the complaints about the Savage self-loader were probably due to a revolver prejudice among the men testing them, but the Savage did have many genuine problem areas. By May 1910, the Cavalry Board, meeting at Fort Riley, Kansas, could report that "It may be said that the sentiment of cavalry officers is generally against the adoption of an automatic pistol for the United States Cavalry." Accordingly, the board recommended that a .45 caliber revolver be adopted instead.[16] Facing the combination of revolver prejudice and mechanical troubles, Savage tried to solve its problems by a judicious application of political pressure. Savage contacted James S. Sherman, vice president of the United States, to ask for a high-level demonstration of their pistol before War Department and Ordnance Department officials.[17] This demonstration, however, did not help Savage's case. By the end of 1910 the Colt Browning self-loader was the obvious winner.

The 1907 Contract Colt Browning Model .45 Caliber Pistols

Colt had also received a contract for 200 .45 caliber (11.43mm) handguns for field tests from the Ordnance Department in 1907. Each one would contain the following new features: nearly vertical ejection, a loaded-chamber indicator, and an automatic safety. This pistol met the Ordnance Department's requirements, but Colt was willing to provide a slightly improved version of the handguns tested in 1907 for only $18.50 each. Of course, the government wanted the improved model. A contract between Colt and the Ordnance Department dated 18 May 1907 specified the delivery of 200 pistols and spare parts by 18 December 1907 for a total cost of $5391.70.

Three men led the design activities at Colt: Carl Ehbets, James Peard, and George Tansley. Peard created the loaded-chamber indicator, which was a flat rectangular plate made of tempered spring steel. This indicator was pinned into the slide so that when the slide on a loaded chamber was closed the indicator would be pressed against the base of the cartridge forcing it to rise above the surface of the slide. U.S. patent 891,438 of 23 June 1908 protected this innovation. Both Tansley and Ehbets created grip safety devices to meet the army's requirement for an "automatic safety." Tansley's design (U.S. patent 891,510, 23 June 1908) drew the firing pin into the slide by means of a spring-loaded pivoting lever. Ehbets' safety (U.S. patent 917,723, 6 April 1909) combined a firing pin withdrawal mechanism with a positive block to the sear. Ehbets' idea was more complex mechanically and more expensive from a manufacturing point of view. The 1907 contract pistols embodied a safety mechanism with the Ehbets-type sear block and the Tansley-type firing pin withdrawal features. In order to ensure nearly vertical ejection, the ejection port was extended up and over the curved surfaces of the slide so that a portion of the port was actually on the top of the slide. The ejector was also repositioned at this time.

By September 1907, Colt's technical staff had completed their prototype 1907 contract pistol, and the company requested that the Ordnance Department inspect and approve the design before they proceeded with manufacturing the lot of 200. This weapon had a spur hammer, rigid lanyard loop, grip safety, modified ejection port and ejector, and a frame cut for the attachment of a shoulder stock-holster. Ordnance officials agreed with the basic elements of the design but suggested that the shoulder stock cut was unnecessary. Manufacture of the 200 pistols began sometime in October or November 1907, and Colt reported to the Ordnance Office that delivery would take place during the week of 10 March 1908, three months late. The 1907 contract Colt Browning pistols were issued in time for the fall target season of 1908 (see table 6–7).

Initial reports from troop commanders were discouraging. Commanding Officer Lieutenant Burnett, Troop H, 4th Cavalry, Fort Snelling, Minnesota, reported that after initial testing

TABLE 6-7 FIELD UNITS ISSUED COLT AND SAVAGE 1907 CONTRACT PISTOLS

Unit	*Pistol*	*Quantity*
Troop H, 2d Cavalry, Fort Des Moines, Iowa	**Colt**	**65**
Troop I, 3d Cavalry	**Savage**	**65**
Troop H, 4th Cavalry, Fort Snelling, Minnesota	**Colt**	**65**
Troop G, 6th Cavalry, Philippines	**Savage**	**65**
Troop K, 10th Cavalry, Manila	**Colt**	**65**
Troop G, 11th Cavalry, Cuba	**Savage**	**65**
School of Musketry, Presidio of Monterey, California	**Savage** **Colt**	**5** **5**

of the 65 Colt pistols issued 40 had broken sears and 3 had broken firing pins. Colt had not properly heat-treated the sears, and they were very brittle. When they broke, they jammed the lock work and the disconnector, which often resulted in uncontrolled automatic fire. Burnett also reported that: "Much difficulty was experienced in conducting the prescribed course on account of the great tendency of the pistol, to jam. This is a most serious objection to the pistol, as it now stands. Almost every pistol used, jammed at some time during the practice and some of them jammed every time a magazine of cartridges was fired. In the majority of cases, the jam occurred with the fifth shot, i.e., the last one in the magazine. The majority of these jams were caused by the point of the cartridge catching between the chamber and the slide, and the [pistol] could only be loaded by pressing on the point of the cartridge with the finger." This jamming and unfamiliarity with the grip safety caused many men to have difficulty in accurately shooting the 1907 model pistols. Even though cavalry officers generally believed self-loaders to be less safe than revolvers, Burnett reported that there were no accidents during the mounted phase of the tests. The ejected shell cases did not seem to bother the horses, but the pistol was found to be difficult to cock and uncock with only one hand. During the spring target season of 1909, Burnett's men shot the 1907 contract Colt Browning again. This time he reported that the "new sears recently issued by the Ordnance Department are a great improvement over those first issued. Not more than two have been broken during the present practice. Still, the relative awkwardness of the pistol compared with the revolver for men on horseback was considered a major drawback, as was the possibility of accidental discharges that might result from carrying the pistol cocked and ready to fire." As a consequence, Lieutenant Burnett considered "the automatic pistol, in its present state, totally unfit for use by troops. Whether or not it would be a valuable arm were all the defects remedied, is a question I have not been able to determine; but I am somewhat doubtful of the wisdom of arming the average enlisted man with an automatic pistol."[18]

Model 1909 Colt Browning Pistol

Comments made by Lieutenant Burnett and others regarding the 1907 contract Colt led John Browning and the men at Colt to completely rework their .45 caliber pistol. The result was a handgun very close in mechanical form to the one ultimately adopted in 1911. Four major defects were corrected in this new pistol. First, the two-link locking system was replaced by a one-link system. Second, the grip safety was improved and simplified mechanically. Third, the magazine release was repositioned to allow release of the feed device with the shooting hand. Fourth, the ejector was improved further. Although never an official designation, this pistol was usually referred to as the Model of 1909.

In the Model 1909 Colt Browning, the forward barrel link was eliminated, as was the cross bar (take-down key) positioned at the muzzle end of the slide. At the muzzle, there was a barrel bushing that was locked in place by the recoil spring plug. That latter part fit into a projection on the front end of the bushing. When the nose of the recoil spring plug was depressed, the barrel bushing could be rotated and removed. The recoil spring could then be removed by pulling it out of the slide cavity. The rear end of the recoil spring was fitted with an internal tubular plug, the back end of which butted against a shoulder on the underside of the barrel. Two locking lugs were used instead of three, and these lugs formed rings around the barrel. A separate lower link pin for the locking link was eliminated by combining the pin's function with that of the pin that served as the mount for the slide lock. As in the 1907 and earlier models, the slide lock was operated by the follower after the last shot in the magazine had been fired. The grip safety was simplified and the firing pin redesigned and held in place by a flat retaining plate assembled into the rear of the slide. In the Model 1909, the hammer had both full- and half-cock notches. The magazine release in this model was completely new, consisting of a transverse pin passing through the frame behind the trigger guard. The ejector and ejection port were altered, resulting in a forward and nearly vertical flight path for the ejected cartridge case. There was no loaded-chamber indicator on this pistol (see fig. 6–31).

After an initial demonstration for Lieutenant Colonel John Thompson and other ordnance officers at Fort Myer, Virginia, John Browning traveled to Springfield Armory on 23 August 1909 to show serial number 1 of the Model 1909 to a board of officers (Captain Charles M. Alles, Captain Walter G. Penfield, and Lieutenant C. A. Meals). The report of the board contained only one negative comment. "The mouth of the

TABLE 6-8 COMPARISON OF EXPERIMENTAL COLT AND SAVAGE HANDGUNS TESTED BY THE U.S. ARMY, 1905-1911

	Colt Model 1905	*Colt 1907 Contract*	*Savage 1907 Contract*	*Colt Model 1909*	*Colt Model 1910*	*Colt Model 1911*
Caliber (mm)	.45 11.43	.45 11.43	.45 11.43	.45 11.43	.45 11.43	.45 11.43
Barrel length (mm)	127	127	133.4	127	127.6	127.6
Overall length (mm)	203	203	229	203	218	218
Weight (grams)	978	978	1006	1015	1057	1057
Rifling/twist	6/R	6/R	6/R	6/R	6/R	6/R
Magazine capacity	7	7	8	7	7	7

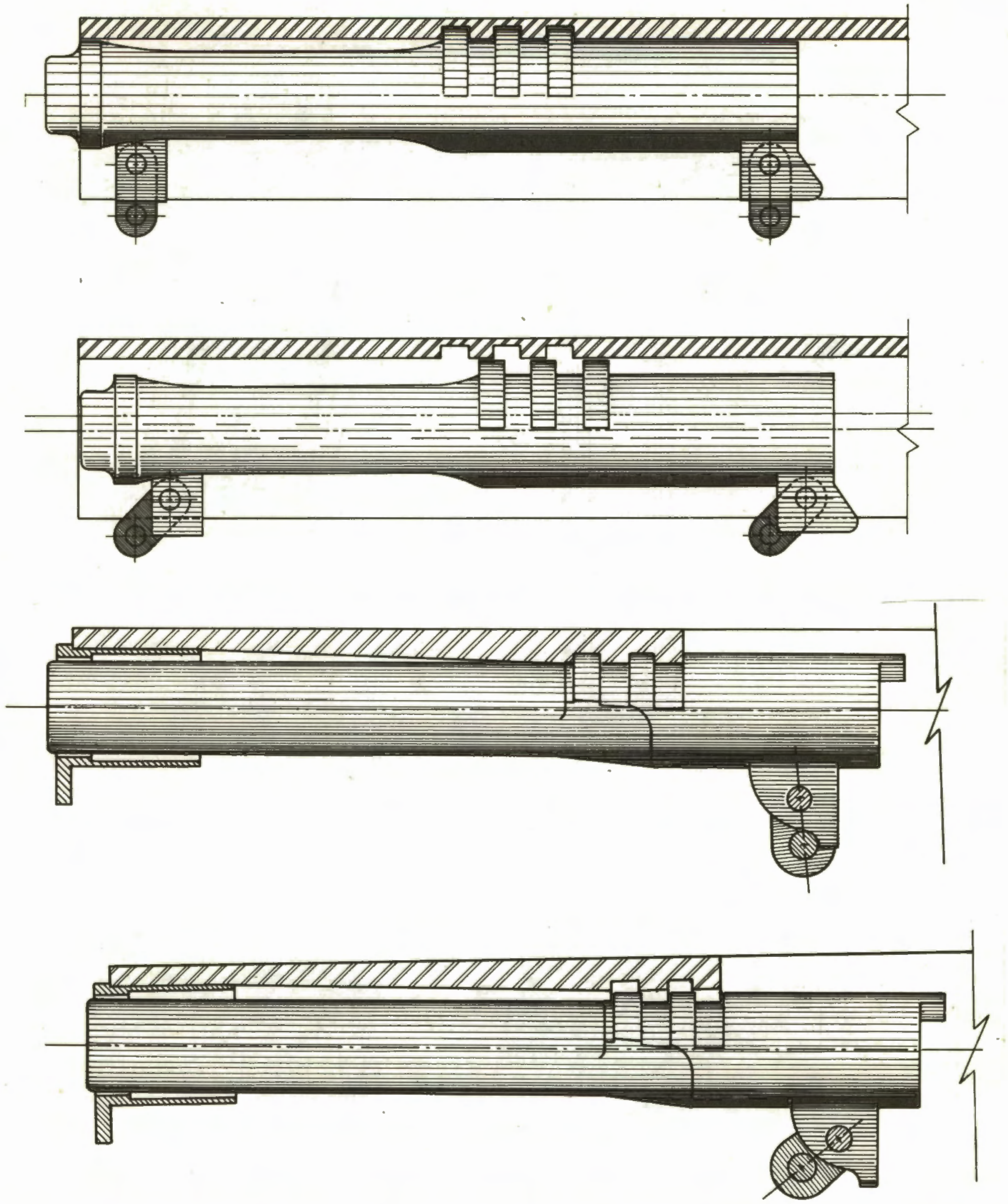
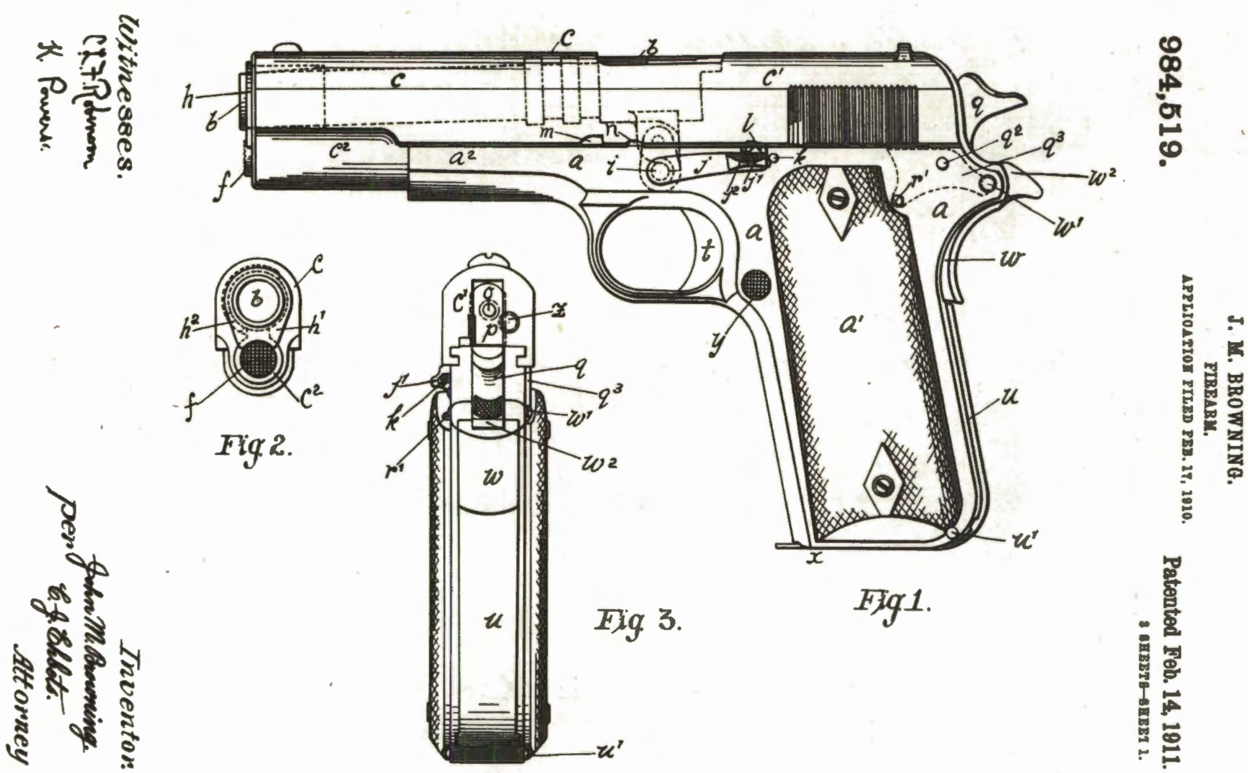


FIGURE 6–30. A comparative view of the Colt Browning double- and single-link locking systems. *Top,* the double-link was used on the Model 1900 and Model 1902 pistols. *Bottom,* the single-link system was incorporated into the Model 1909 and Model 1911 pistols. (*Simmons*)

magazine was deformed during firing and it is recommended that the upper part of the magazine be spring tempered to overcome this defect."[19] Between August and November 1909, Colt model makers built 18 more prototypes of the Model 1909. Pistol number 13 was tested at Fort Myer in February 1910, with a total of 2,800 rounds being fired. Another firing trial was held at Frankford Arsenal in March. That same month, Browning visited the School of Musketry at the Presidio of Monterey near San Francisco to demonstrate pistols 1 and 10, where a total of 3,200 rounds were fired.

Both the Frankford and School of Musketry Boards recommended the Model 1909 for further consideration. The Frankford report commented: "As a result of the . . . test it is the opinion of the Board that this pistol is more satisfactory to issue to the Service than any other semi-automatic pistol known to have been tested by the Department. It is recommended that a number be purchased for further trial by troops in service." The School of Musketry Board reported: "Without reciting the seventeen requirements of a service pistol of the automatic type as given in the 1907 Pistol Board . . . , it may be concluded from the results obtained with this model that it fulfills substantially the specifications enumerated as essential in an automatic pistol for the mounted service. . . . " The Musketry School Board's report continued:

> This pistol embodies the main essentials of an effective hand fire arm for mounted troops, viz: striking power, accuracy, reliability of action and rapidity of fire. The apparent strength of its



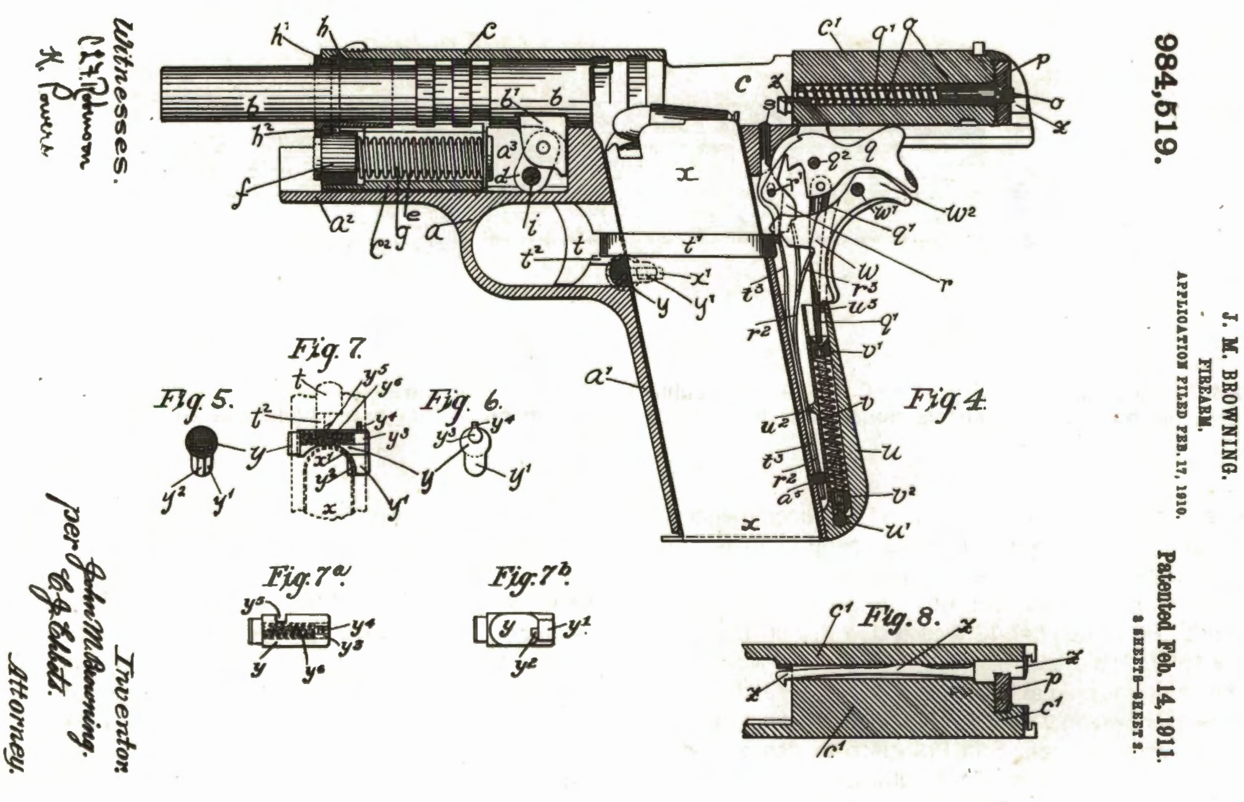


FIGURE 6–31. These drawings from U.S. patent 984,519 illustrate the Model 1909 Colt Browning pistol. Note that this is the first model with the single locking link, barrel bushing, recoil spring plug, and improved magazine release. (*U.S. Patent Office*)

component parts should insure durability, and the comparative simplicity of its parts and action should enable the average soldier to comprehend its operation, learn to take care of it and attain proficiency in its use in a reasonable time.

Experience may suggest changes in the present sight or other minor particulars, but possible improvements do not detract from well established merits.

Accepting as a principle the desirability of an automatic pistol for use in the service, it is believed that the present model Colt's Automatic Pistol possesses merits which would justify its adoption and issue, and recommendation to that effect is therefore made.[20]

By the spring of 1910, the School of Musketry and the Field Artillery Board were convinced that a self-loading pistol of the Colt Browning-type would be a desirable addition to their armament. But as previously mentioned, the Cavalry and Infantry Boards remained unconvinced. Meanwhile, the Colt technical staff was working on yet another new model based on a prototype built by Browning. The designer had talked with the staff at the School of Musketry about the so-called Model 1910, which had the grip set at a greater angle. Commenting on blueprints they had received from Colt, the staff remarked: "The change in the angle between the handle and the axis of the barrel will probably prove a desirable feature in offsetting the natural tendency to shoot low in rapid fire. In the 1910 model the blue print shows the trigger sear and safety springs in one three-leafed spring, instead of two springs, one of which is two-leafed, as in the 1909 model."[21] The grip of the Model 1909 was set at an 84-degree angle to the axis of the bore; the Model 1910 had an angle of 74 degrees.

Model 1910 Colt Browning Pistol

At its 9 February 1910 debut at Fort Myer, the Model 1910 did not eject satisfactorily, and several of its parts broke. Another demonstration five days later was more successful, but Browning took his pistol back to Hartford and reworked several aspects of the design. The Model 1910 subsequently received high praise from ordnance officials: ". . . it is the opinion of this office that the advantages of this arm over the model with outside extractor and lesser angle of stock are such as to render its development to a point where it will operate satisfactorily . . . the later model, on account of its more satisfactory grip, will meet the less opposition in the service. It is, therefore, requested that you exert every possible effort to the end that the later model may be brought to a point where its certainty of operation is equal to that of the former model."[22] And even the Infantry Board was converted:

After due consideration, examination and actual test at firing by each member of the Board, the Board is of the opinion that the Colt's automatic pistol, caliber .45, of improved design, is convenient and accurate; and in the hands of a well trained and intelligent soldier, reliable and safe but in the hands of unexperienced soldiers, there is more danger from accidental discharge than from the revolver now being issued.

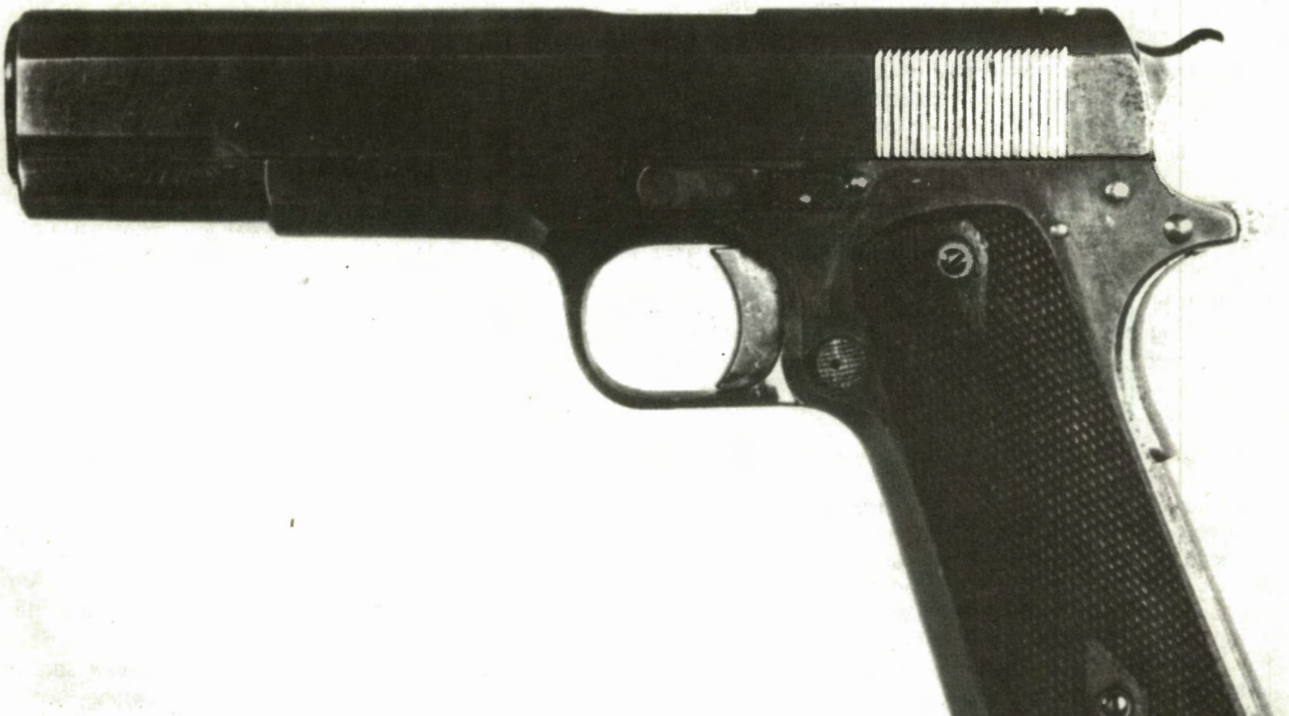


FIGURE 6–32. John Browning's prototype of the Model 1910 pistol, which after some changes would become the U.S. Pistol, Caliber .45, M1911. (*U.S. Army*)

FIGURE 6–33. A 1911 army photgraph of the *Colt Automatic Pistol, Calibre .45 Special Army Model 1911* (serial number 5). This was the last of the prototypes before the first production Model 1911 pistol. (*U.S. Army*)

> The Board is unable to pass on the question of its serviceability without actual test which can only be made by having a number of pistols issued to troops under service conditions for a reasonable time.[23]

The Cavalry Board, however, was still opposed to self-loaders. An officer on the General Staff commented on the cavalry's fears: "It looks as if the Cavalry were afraid of the automatic. It seems strange to me that anyone can prefer the old gas-leaking lead-splitting Colt revolver to the present perfected automatic." The staffer went on to voice a common feeling among military men about the automatic.

> In my opinion the *real* fear of the automatic in the hands of the troopers comes from the uncertainty of the weapon when he has fired less than the magazine full and wants to cease firing.
>
> In the case of the revolver the hammer is down on an empty cartridge case and safe, while with the automatic it is at full cock and the weapon cannot be safely inserted in the holster unless the hammer is let down by the thumb while grasping the handle and pressing the rib. . . .
>
> I don't suppose it is possible to make an absolutely safe pistol although the combination of trigger and rib would seem to me to go a long way toward it.[24]

In answer to several comments about the Model 1910's safety, the Colt technical staff experimented with several different mechanical safety devices. By the summer of 1910, they had developed a safety that seemed to answer the complaints of the service boards. It consisted of an external plate with an integral pivot pin at right angles and an integral stud that traveled in a cutout on the frame, projecting into the firing system cavity behind the sear. The pivot pin also served as the grip safety. The device was accompanied by a small-diameter tube fastened to the side of the frame in a horizontal position above the left grip piece. The tube contained a pair of spring-loaded plungers, the left plunger acting on the slide lock, eliminating the need for the small internal plunger and spring of the Model 1909. The right plunger acted on the safety, holding it in the off position by projecting into a small notch on the left side of the safety. When raised, this new safety blocked the sear. Thus, the loaded pistol could be safely carried with the hammer "cocked and locked."

A perfected Model 1910 prototype was tested along with an improved Savage pistol by a board of officers (Major Kenneth Morton, Major Walter G. Penfield, Lieutenant C. A. Meals, and Lieutenant Arthur D. Minick) at Springfield Armory on 10 November 1910. The trial was of major importance. Colt was represented by President Colonel W. V. Skinner, Vice Presidents P. C. Nichols and C. L. F. Robinson, Plant Superintendent James J. Peard, John Browning, two engineers, and a mechanic. Savage was similarly represented, with President Benjamin Adriance, Vice President William Green, Plant Superintendent F. C. Chadwick, Elbert Searle, and two mechanics on hand. Testing began with a detailed examination of the pistols, that gave special attention to the safety devices. Field stripping and complete disassembly

were performed and timed. The Colt was more readily dismounted for field stripping, while the Savage was completely disassembled in less time. Colt's pistol had 64 separate components, including the magazine; the Savage had 45. In the next examination, the velocity at 7.62 meters was measured: 262 meters per second for the Colt, 258 meters per second for the Savage. In the accuracy trial, the Colt proved better than the Savage by shooting an average group of 49 millimeters, compared with 72 millimeters with the Savage. Penetration test results were puzzling. The Colt penetrated more pine boards than the Savage, but the Savage did better on a solid oak block. In the combined accuracy-rapidity tests, the Colt was faster and more accurate than its competitor. An endurance trial of 6,000 rounds was fired also. The firing was done in cycles of 100 rounds, after which water was poured through the barrels to cool the pistols. After every 1,000 rounds, the pistols were cleaned and oiled. In the first 1,000 rounds, the Colt had 5 malfunctions, 3 of which were due to lack of adequate lubrication. The Savage had 4 malfunctions; its sear had broken, and the right grip piece split and came off. During the second 1,000 rounds, the Colt had 4 malfunctions, and the barrel split and had to be replaced. The Savage experienced 22 malfunctions; its extractor broke and was replaced. In the third 1,000, the Colt had 2 malfunctions; the mechanical safety broke but did not disable the pistol. The Savage had 7 malfunctions; grip pieces split, and the bolt stop broke. In the fourth 1,000, the Colt had no malfunctions, but the slide lock failed to act properly, the grip piece screws came loose on several occasions, several jams were caused by improper feeding, and the extractor and magazine floor plate broke. The Savage suffered a broken barrel lug and bolt lock spring. In the fifth 1,000 rounds, the Colt had 1 malfunction; the Savage 5, plus a broken sear lock. In the sixth 1,000, the Colt had no malfunctions, but the grip piece screws continued to work loose. The Savage had 5 malfunctions resulting from a faulty magazine. A summary of broken parts in both automatic pistols revealed that the Colt required 4 replacements, the Savage 13. A .45 caliber Colt revolver (Model 1909) had been fired throughout the tests as a control; it had only 2 malfunctions during 6,000 rounds, the first due to the absence of powder in a cartridge, the second to a sticking cylinder latch.

The usual series of tests with slightly altered ammunition were performed as well. Functional performance of the pistols was checked by firing underloaded and overloaded cartridges. Both pistols passed these tests successfully, but the barrel of the Colt developed a crack. To determine if this new fault would impair the pistol's performance, the board ordered a second 6,000-round endurance test. That trial was halted after only 456 shots because the barrel cracked completely and damaged the slide.

In rendering their report, the officers of the board listed the objectionable features they found in the Colt and the Savage:

> The Colt pistol barrel is improperly designed, in that it has an unnecessary slot near the point of greatest pressure. The receiver is not sufficiently strong as shown by the number of cracks. The follower in the magazine is not made of proper material. The mouth of the magazine should be made of better material to prevent spreading. The stock screws should be made larger without increasing the pitch to prevent their becoming loose.
>
> In the Savage pistol the recoil is excessively severe, being especially noted by the men firing the test for endurance. The safety lever is not shrouded in the frame causing pinching of the hand. It has but one safety. The stocks are not properly designed causing them to break and are not sufficiently secure in their fastenings. The bolt stop is exceedingly difficult to operate and is not in a convenient position. The magazine catch is unduly hard to operate and the magazine cannot be removed with sufficient ease. The extractor is not sufficiently well designed causing irregular extraction, sometimes causing the empty shell to be thrown directly to the rear in the face of the firer. On account of its design it is easily broken. The magazines are not made of proper material, allowing them to be deformed and causing jamming of the pistol when deformed. The sear lock is not strong enough as indicated by the number of breakages. Should the forward end of this lock be broken there would be no indication and the pistol could then be fired by pulling the trigger without manipulation of the safety lever. The pin hole for the magazine catch is too near the edge. The trigger required more pressure than is believed to be desirable.

Evaluating this performance record, the board rendered the following opinion:

> That both automatic pistols are reasonably sure in their action and reasonably safe to handle, the Colt on account of its extra safety feature and showing less number of broken parts and fewer interruptions during the test, is believed to be much the better;
>
> That neither pistol is sufficiently reliable, nor had sufficient endurance to compare favorably with the Colt's double action revolver, cal. .45, model of 1909. Both, however, are better balanced and can be fired much more rapidly and with greater accuracy when firing rapidly. Both pistols are believed to be more safe in carriage. Both are more convenient to carry in a holster on account of their shape;
>
> That all parts of either pistol can be made interchangeable, whereas all parts of the revolver cannot. That the rapidity of loading, ease of manipulation, safety in firing and carriage, and rapidity of fire are much greater with these automatic pistols than the revolver;
>
> That all three pistols are of .45 calibre and have a bullet of suitable weight and velocity for service. That neither automatic pistol in its present design is believed to be satisfactory for adoption in the service because of insufficient strength of parts and in case of the Savage of insufficient reliability of action. The Colt automatic pistol is believed to be much the more satisfactory of the two.[25]

Improved Colt and Savage Models

This November 1910 trial forced Colt and Savage back to the drawing boards. By March 1911, Colt had completed six examples of their "Colt Automatic Pistol, Calibre .45, Special Army Model 1911." Compared with the Model 1910, this newest pistol was modified as follows. Two locking lugs were cut into the top of the barrel, leaving the underside of the barrel with a solid, enlarged diameter section at the chamber, thus strengthening the barrel. The mechanical safety plate of the 1911 was enlarged, as was the left grip plate so that it overlapped the tubular housing of the safety and slide-lock plungers. In addition, there were a number of other minor design changes. As a result, the Model 1911 pistol was slightly heavier than its predecessor.

On 3 March 1911, the November Board of Officers were reconvened to examine the modified Colt and Savage pistols. The same observers were present for the tests, which followed the same format as those conducted the previous winter. The performance of the Model 1911 Colt was almost faultless, while the Savage experienced 31 malfunctions and a number of broken or damaged parts. Not surprisingly, the board rendered a very positive report favoring the Colt Browning pistol.

> Of the two pistols, the Board is of the opinion that the Colt's is superior, because it is the more reliable, the more enduring, the more easily disassembled, when there are broken parts to be replaced, and the more accurate. . . .
>
> The Board therefore recommends that the Colt Calibre .45 Automatic Pistol of the design submitted to the Board for test be adopted for use by foot and mounted troops in the Military service in consequence of its marked superiority to the present service revolvers, and to any other known pistol, of its extreme reliability and endurance and of its fulfillment of all essential requirements.[26]

On 29 March 1911, nine days after the board officially delivered its report, the secretary of war approved the selection of the Colt Browning as the "U.S. Pistol, Automatic, Calibre .45, Model 1911."[27]

By late spring, Colt was gearing up to produce the Model 1911. Most of the precontract details had been ironed out by the end of April, and ordnance officials in Washington had provided Colt with the necessary paperwork (letters of intent, specifications, drawings), while Colt had submitted their cost data and projected delivery schedules. Colt agreed to manufacture the handguns for $14.25 each, with extra magazines running fifty cents each and packing crates (for 50 pistols) $6.00 each. The holsters for the 1911 would be manufactured by the government at the Equipment and Harness Shops of the Rock Island Arsenal. Once the agreement for government manufacture of the pistol under license at Springfield Armory (in addition to the pistols Colt would manufacture in Hartford) had been finalized, the army issued its first purchase order on 5 May for 31,344 pistols and twice that many spare magazines. Spare parts, screw drivers, and packing crates brought the total contract price to $490,000. In addition to the standard Colt markings, plans called for the Model 1911 to be marked with "UNITED STATES PROPERTY" on the left side of the frame and "CALIBRE .45/MODEL OF 1911 U.S. ARMY" on the right side of the slide. However, the caliber .45 marking was dropped and the company markings altered to read "PATENTED APR.20.1897 SEPT.9.1902. DEC.19.1905.FEB.14.1911.

In about June 1911, the army ordered an additional 4,000 pistols, and in July the navy requested 7,000. Government officials were eager to procure 50,000 handguns so that they could begin their own production of the Model 1911 at Springfield. (The licensing agreement with Colt required that the army, with other government bodies, acquire 50,000 pistols before they could begin manufacturing the pistol.) Another army order in mid-November raised the total to 51,344, opening the way to production at the Armory.

Serial number 1 of the Model 1911 (production version) was delivered to the army on 4 January 1912 (see table 6–9 for a summary of the delivery schedule of the first 31,344 pistols). Production at Colt was not as rapid as planned, and by the middle of February Colt was 800 pistols behind schedule; by 23 March they were 2,000 behind; and by 23 April they were 3,000 behind. For two weeks in May, no pistols were accepted by Army Inspector Major Walter G. Penfield. There were delays again in July, and the factory was closed by a strike in September. Beginning the week of 28 September 1912, production picked up again, and by 12 May 1913 the first order of 31,344 pistols had been filled. By the time the United States entered the First World War on 6 April 1917, Colt and Springfield Armory had manufactured a combined total of 143,050 Model 1911s (Colt 112,255; Springfield Armory 30,795).* Colt manufactured about 513,600 M1911s by the end of 1919, and Springfield made about 45,000 more during 1918. In addition, the Remington-UMC factory fabricated another 21,625. From 1912 through 1919, the grand production total was about 723,275 pistols.

TABLE 6-9 DELIVERIES OF THE FIRST CONTRACT MODEL 1911 COLT BROWNING PISTOLS

Deliveries Week Ending	*Number of Pistols Accepted during Week*	*Total Pistols Delivered to Date*
4 Jan 1912	50	50
8 Jan 1912	50	100
3 Feb 1912	200	300
15 Feb 1912	200	500
28 Feb 1912	500 (navy)	1,000
22 Mar 1912	500	1,500
23 Apr 1912	1,000	2,500
18 May 1912	500	3,000
25 May 1912	400	3,400
1 Jun 1912	100	3,500
8 Jun 1912	300	3,800
15 Jun 1912	1,300	4,300
22 Jun 1912	200	4,500
24 Aug 1912	1,000*	5,500
31 Aug 1912	1,000	6,500
28 Sep 1912†	1,000	7,500
12 Oct 1912	500	8,000
19 Oct 1912	500	8,500
26 Oct 1912	1,000	9,500
2 Nov 1911	2,000	11,500
9 Nov 1912	2,000	13,500
16 Nov 1912	700	14,200
23 Nov 1912	800	15,000
7 Dec 1912	1,000	16,000
14 Dec 1912	250	16,250

*Bady summarizes the Springfield production story in *Colt Automatic Pistols*.

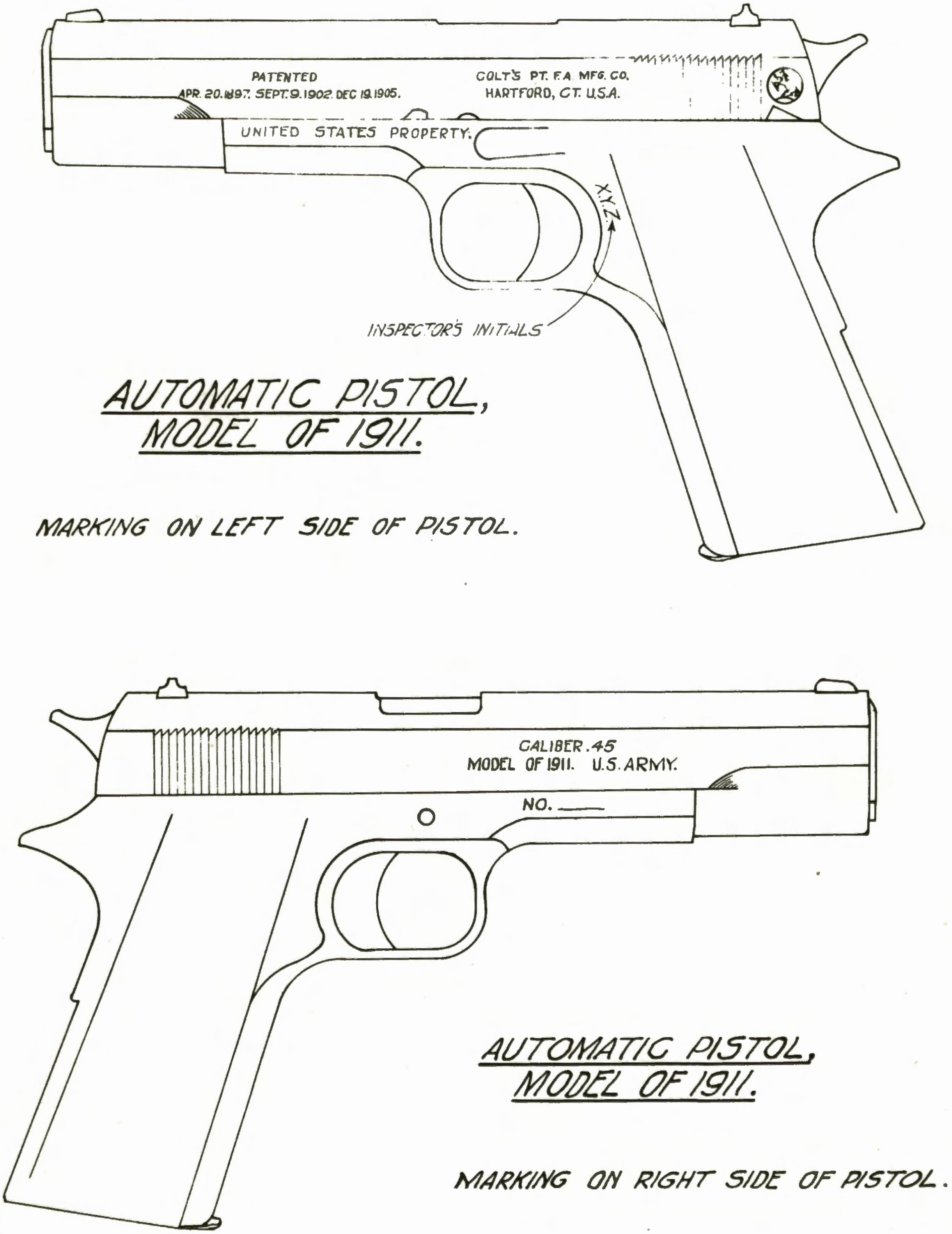


FIGURE 6–34. Original slide markings proposed for the Model 1911 pistol by the U.S. Army and Colt. (*U.S. Army*)

TABLE 6-9 DELIVERIES OF THE FIRST CONTRACT MODEL 1911 COLT BROWNING PISTOLS *Continued*

Deliveries Week Ending	*Number of Pistols Accepted during Week*	*Total Pistols Delivered to Date*
21 Dec 1912	750	17,000
28 Dec 1912	500	17,500
4 Jan 1913	1,000	18,500
11 Jan 1913	700	19,200
18 Jan 1913	500	19,700
25 Jan 1913	1,000	20,700
1 Feb 1913	600	21,300
8 Feb 1913	400	21,700
15 Feb 1913	500	22,200
22 Feb 1913	800	23,000
1 Mar 1913	1,250	24,250
15 Mar 1913	500	24,750
22 Mar 1913	700	25,450
29 Mar 1913	1,300	26,750
5 Apr 1913	1,200	27,950
12 Apr 1913	750	28,700
19 Apr 1913	500	29,200
26 Apr 1913	450	29,650
5 May 1913	1,289	30,939
12 May 1913	511	31,450

*Some figures include conditional acceptances, later made official.
†Colt workers on strike during September 1912.

WEAPONS FOR WORLD WAR I

The war years were, as might be expected, confusing times. The U.S. Army entered the war short of every kind of weapon, ammunition, and equipment. There were only some 110,000 handguns on hand. The Ordnance Department *History of Rifles, Revolvers, and Pistols* of 1920 reported that there were about 25,000 Colt .38 caliber Army revolvers (Models 1894 through 1903), 5000 Colt .45 caliber revolvers (Model 1909), and about 80,000 Model 1911 automatics. (If this estimate is correct, some 63,000 Model 1911s had disappeared in four and a half years.) Since the army planned to issue handguns to 60 percent of its troops, or 765,000 pistols, for a projected army of 1.25 million, a crash manufacturing program had to be undertaken. Later, the required number of pistols required was raised to 950,000. When the war ended on 11 November 1918, the total number of M1911s ordered had reached 3 million. Colt was America's largest firearms company in 1917, but even they could not be expected to keep up with this kind of demand. During 1917, Colt was producing an average of 450 pistols per day, but in January 1918 the daily average reached 2,290. As amazing as these production figures were, they were not enough, and the Ordnance Department sought other producers for their military handgun.

Wartime contracts were awarded as noted in Table 6–10. The Remington-UMC contract was let in January 1918, while the other supplementary contracts were issued in July and September. As can be seen, only Colt and Remington-UMC

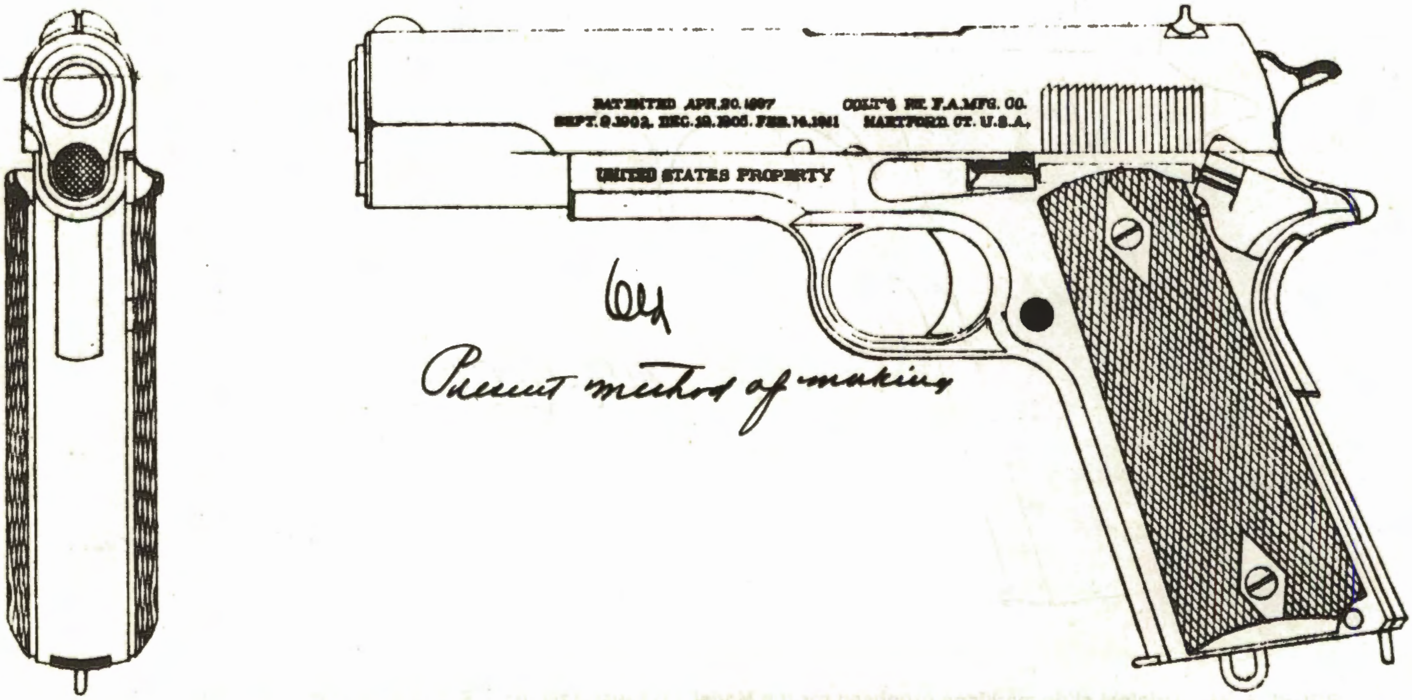


FIGURE 6–35. New markings adopted for the M1911 pistol in November 1911. (*U.S. Army*)

FIGURE 6–36. A World War I M1911 pistol as manufactured by Colt. (*National Defense*)

came through, but not with the quantities the government needed. To supplement the automatic pistols being produced at Springfield and by private industry, the American armed forces brought out their revolvers once again.

Model 1917 Revolvers

Early in 1917, the army ordered .45 caliber revolvers from Colt and Smith & Wesson to help fill the requirements for handguns. Smith & Wesson was given an initial order in April for 100,000 .45 caliber revolvers (the .45 N frame Hand Ejector revolver, which had been submitted to the army for testing in January 1916). Joseph Wesson, founder Daniel B. Wesson's son, had modified this revolver so that it would fire the .45 caliber (ACP) automatic pistol cartridge. Three of the rimless cartridges were held in a half-moon clip. The first of the U.S. Revolvers, Caliber .45, Model 1917 (Smith & Wesson) were delivered on 6 September 1917. Although Smith & Wesson tried to increase production, the government stepped in and took control of the factory on 13 September 1918. When the war ended, the Smith & Wesson works were producing 14,500 Model 1917s a month. The 163,476 built during the war had a separate serial number series starting with 1. Colt manufactured about 150,000 .45 ACP-firing versions of the M1909 New Service Revolver, also called the Model 1917. Of the approximately 310,000 Model 1917 Colt

TABLE 6-10 WWI PRODUCERS OF THE M1911 UNDER CONTRACT

Company	*Number Ordered*	*Number Delivered*
Remington Arms-Union Metallic Cartridge Bridgeport, Connecticut	**150,000**	**21,265**
Winchester Repeating Arms New Haven, Connecticut	**100,000**	
Burroughs Adding Machine Detroit, Michigan	**250,000**	
Lanston Monotype Machine Philadelphia, Pennsylvania	**100,000**	
National Cash Register Dayton, Ohio	**500,000**	
A.J. Savage Munition San Diego, California	**100,000**	**reportedly a "handful"**
Savage Arms Utica, New York	**300,000**	
Caron Brothers Manufacturing Montreal	**300,000**	
Dominion Rifle Plant (Ross) The North American Arms Co., Ltd., Quebec	**50,000**	**ca 100**

FIGURE 6–37. Two typical World War I Remington-UMC-made M1911 pistols. The top pistol is serial number 20,235 of a total of 21,676 pistols. (*Smith/ Krcma*)

FIGURE 6–38. A World War I vintage M1911 manufactured by the North American Arms Co., Ltd. Only about 100 pistols are believed to have been built by this firm. This example is serial number 63. (*Krcma*)

revolvers manufactured, only 268,000 were completed by the armistice on 11 November 1918.[28]

By mid-1919, production of Model 1911 pistols and Model 1917 revolvers had been closed down. Substantial quantities of the finished and partly finished components were shipped to Springfield Armory for the government's retention. In addition, a set of machine tools, jigs, fixtures, and inspection gauges was created from the production equipment that had been purchased with government funds for the nine wartime supplementary contractors. With this equipment, the army would be able to establish a model 1911 pistol manufacturing line in short order should the need arise. This machinery was also stored at Springfield.

TABLE 6-11 TOTAL MODEL 1911 PRODUCTION BY YEAR, 1912–1919

Year	*Total Manufactured*	*Number Issued to Army*	*Number Issued to Navy*	*Number Issued to Marine Corps*
1912	**17,250**	**9,950**	**7,000**	**300**
1913	**43,150**	**35,900**	**6,000**	**1,250**
1914	**47,196***	**46,696**		**500**
1915	**25,590***	**25,090**	**500**	
1916	**4,214**	**4,214**		
1 Jan–6 Apr 1917	**5,650**			
7 Apr–31 Dec 1917	**75,600**	**†**		
1918	**332,000 (Colt)** **13,152 (Remington-UMC)** **ca 45,000 (Springfield)**			
1919	**106,000 (Colt)** **8,523 (Remington-UMC)**			

*Combined totals for Colt and Springfield Armory
†After 1916, most 1911s were issued to the army, with only small quantities going to the other services.

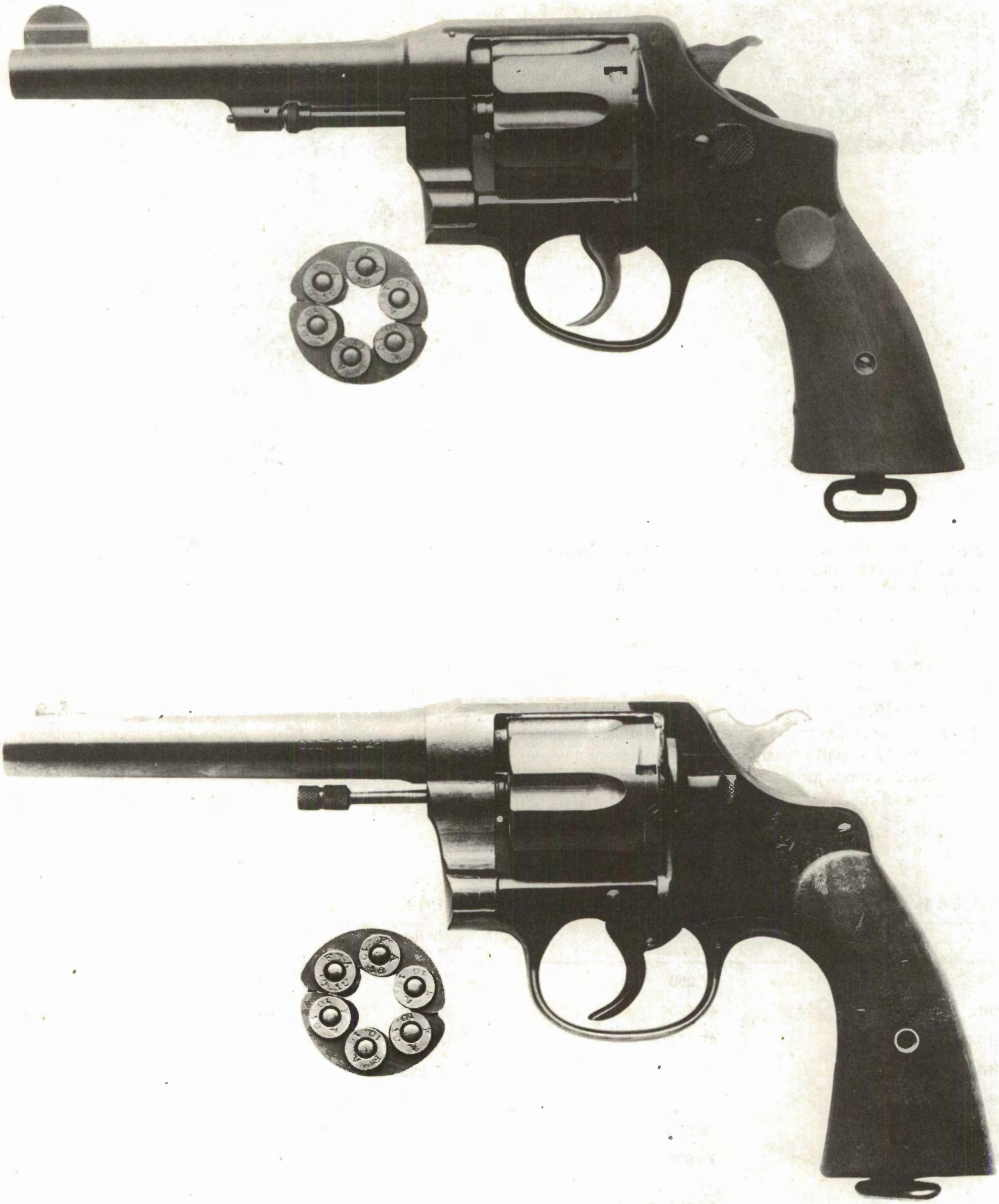


FIGURE 6–39. U.S. Army photos dating from 1918 of the U.S. Revolvers, Model 1917. *Top*, Smith & Wesson hand ejector Model 1917. *Bottom*, Colt New Service Model 1917. Both fired the M1911 automatic pistol cartridge (.45 ACP) held in three-shot half-moon clips. (*U.S. Army, National Archives*)

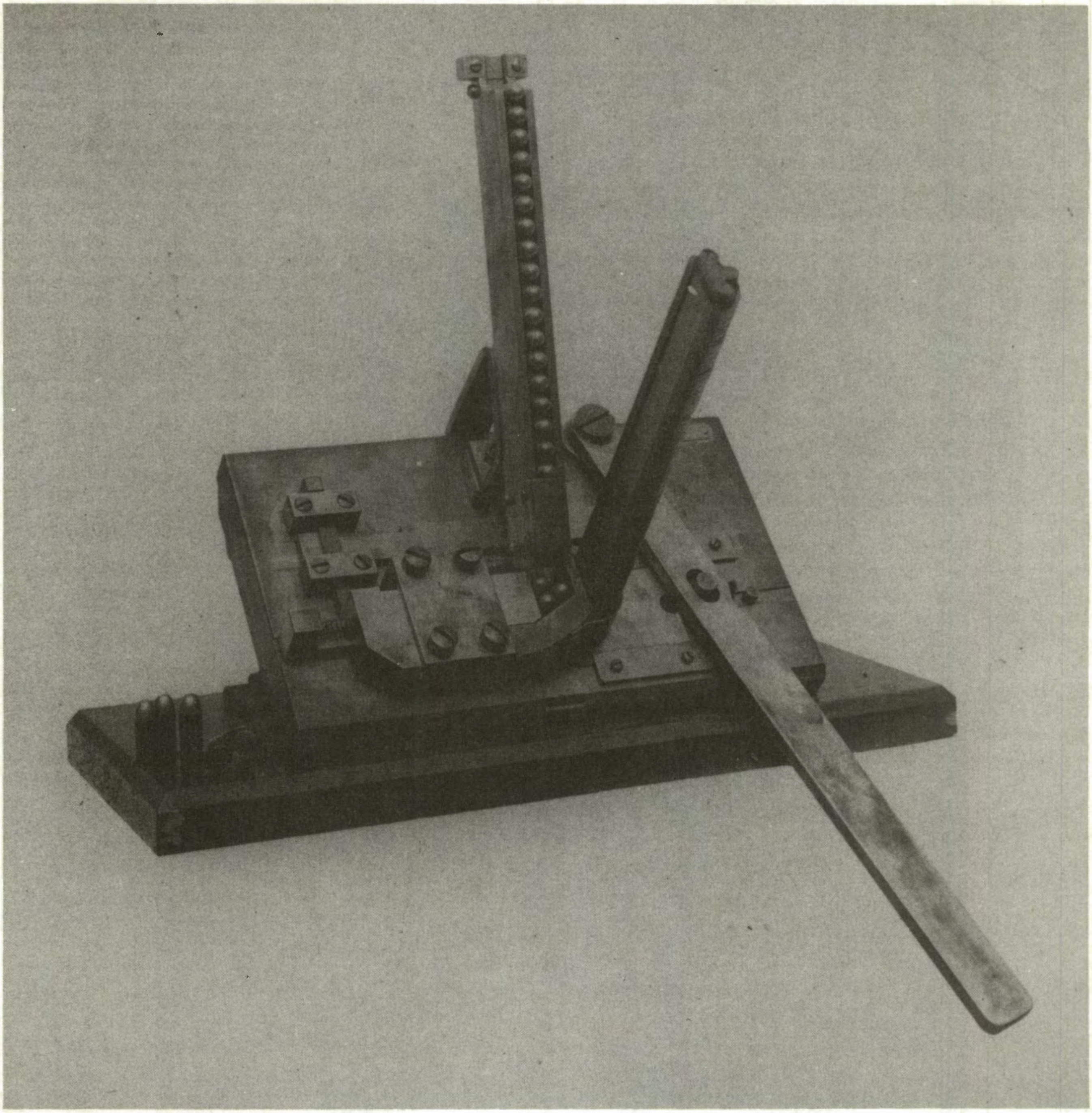


FIGURE 6–40. A 1918 U.S. Army photograph of a half-moon clip-loading machine. (*U.S. Army/National Archives*)

Model 1911A1 Pistols

Shortly following the end of the First World War, the Cavalry Board began studying possible improvements to the Model 1911 pistol. On 11 December 1920, the chief of cavalry suggested to the Ordnance Department that the width of the hammer spur be reduced and its length shortened and that the tang of the grip safety be lengthened. The first two changes would make the pistol easier to cock, and together the modifications would reduce the tendency for the hammer to pinch the web of flesh between the user's thumb and forefinger when the pistol was fired. In March 1922, Springfield Armory recommended that future manufacture of the Model 1911 incorporate a narrower trigger, a longer grip safety tang, and an arched mainspring housing. In mid-1923, the nomenclature *Modified Pistol, Calibre .45" Model 1911* was assigned to the modified weapon. Colt was directed to prepare a pilot production specimen of the pistol, and by the end of September 1923 had submitted five specimens to the Ordnance Office. In October, Colt was advised that the pistols were satisfactory and that the modifications should be incorporated in all subsequently built guns. During that same month, the diameter of the barrel, as measured across the lands (rifling) was reduced from 11.3mm to 11.25mm. The

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CAMP JACKSON,
COLUMBIA, S.C.
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SMITH & WESSON.

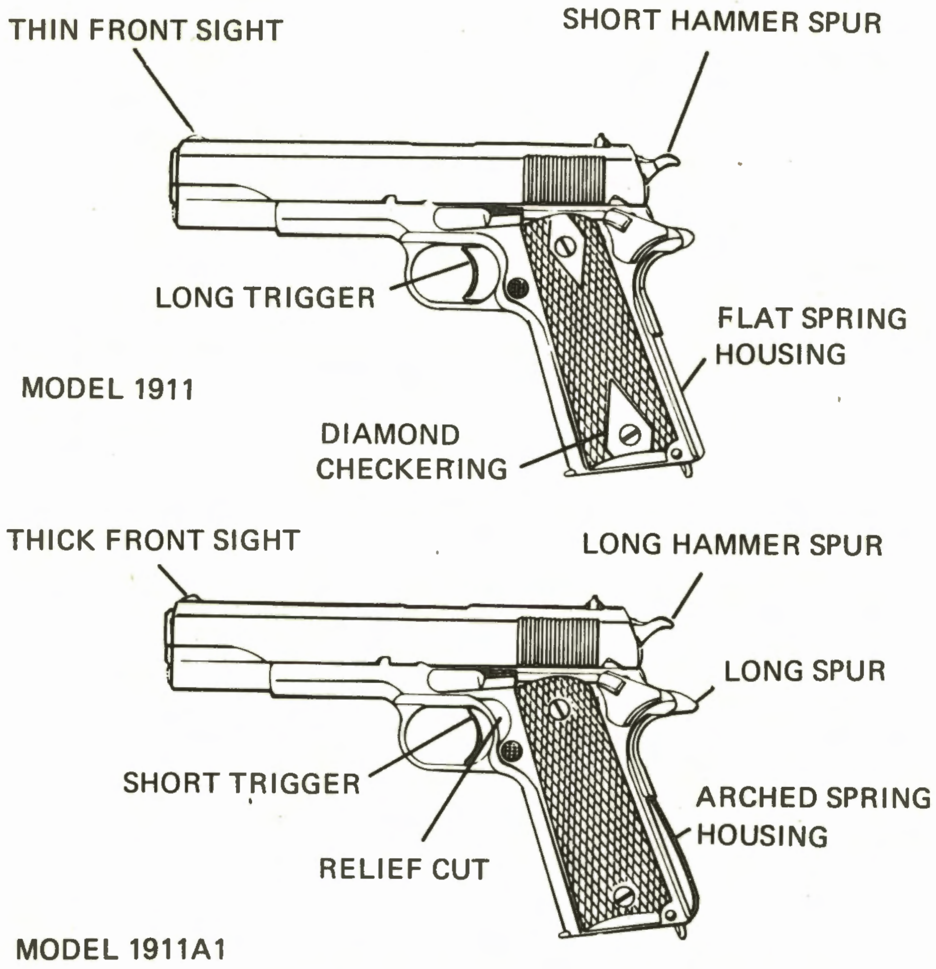


FIGURE 6–42. This illustration points out the major differences between the Models 1911 and 1911A1. The parts are interchangeable; it is possible to put a Model 1911 slide on a Model 1911A1 frame, or the reverse. One can also fit a Colt-made slide onto Remington-Rand-, Ithaca-, or Union Switch and Signal-made frames. Any combination of frame and slide is possible on United States military handguns. Ordnance repair personnel used whatever parts they had in stock regardless of manufacturer. (*Hoffschmidt*)

height of the lands was increased from 0.0762mm to 0.0889mm.

There was a brief debate over the best name for this modified pistol; *Modified Pistol, Calibre .45" Model 1911* was not acceptable. The Infantry and Aircraft Armament Division of the Ordnance Department's Manufacturing Service wanted to call it the *Pistol, Automatic, Caliber .45, M1911A1.* The Ordnance Department Field Service preferred *Pistol, Automatic, Caliber .45, M1. Pistol, Automatic, Caliber .45, Model 1911M1* was also suggested. On 17 May 1926, the Ordnance Committee decided that all pistols manufactured to the new specifications and any converted Model 1911s would be called the *Pistol, Automatic, Caliber .45, M1911A1.* In the future, only M1911A1-style components would be manufactured. To further clarify matters (or confuse them), all pistols above serial number 700,000 were proclaimed to be Model 1911A1s, while all below that number were Model 1911s. On 15 June 1926, the nomenclature was fixed as *Automatic Pistol, Calibre .45, Model of 1911A1.* To summarize, the modifications appearing on the Model 1911A1 were:

(a) Tang (or comb) of the grip safety extended;
(b) Clearance cuts made on the receiver (frame) immediately behind the trigger;
(c) Mainspring housing arched and knurled,
(d) Face of the trigger cut back and knurled,
(e) Width of front sight increased, and
(f) Land diameter reduced, height of lands increased.

The official government "Master Engineering" drawings reflecting all these changes were not completed until May 1928.

An interesting problem was encountered when the Ordnance Department decided to create a standard set of final inspection gauges for the Model 1911A1 pistol. During World War I, such gauges had not existed for the Model 1911, and

FIGURE 6–41. The Smith & Wesson Model 1917 revolvers were dipped into a preservative (petrolatum) before they were packed 25 to a wooden packing crate. (*National Archives*)

when the Armory's Gauge Section delivered its new inspection gauges in 1932 it was discovered that gauges made to the official engineering drawings would not accept the components as made at Colt. Parts made in Hartford would not be interchangeable with those made by another manufacturer who had relied on the master drawings. Ordnance officials developed a new set of gauges dimensioned to accept the Colt components and changed their drawings to reflect the differences between the government's paper pistol and the pistol actually being made in Connecticut.

When the army decided to order 10,000 Model 1911A1 pistols in 1935, the Ordnance Department applied the policies established in an 18 October 1932 directive covering the establishment, maintenance, and revision of ordnance drawings. New drawings for the manufacture and inspection of the Model 1911A1 pistol were completed on 15 January 1935. These new drawings ensured interchangeability of components in all Model 1911 and Model 1911A1 pistols and served as the basis of manufacturing this handgun during World War II.

Interwar Years Production

In June 1939 as war clouds gathered over Europe, the Ordnance Department requested bids for small "educational orders" from companies that wished to familiarize themselves with the production of equipment that might be needed in the event of war. Eight companies were asked to bid on the manufacture of the Model 1911A1 pistol: Harrington & Richardson Arms Company, Burroughs Adding Machine Company, Marlin Firearms Company, Winchester Repeating Arms Company, Singer Manufacturing Company, Savage Arms Company, Iver Johnson Arms and Cycle Works, and the Lanston Monotype Machine Company. Singer and Harrington & Richardson were awarded educational orders for 500 pistols each.

Harrington & Richardson did not deliver any pistols under their contract, and although Singer did deliver its 500 pistols they did not complete a subsequent larger order for 15,000 Model 1911A1s because they had a higher priority contract for M5 Artillery Fire Control Directors.* The jigs, fixtures, and gauges fabricated by the Singer technicians, along with the drawings for these items, were transferred to the Ithaca Gun Company.[29]

The Ithaca Gun Company was the first industrial contractor in World War II to accept a major order for the Model 1911A1. They were able to build upon the experience and production hardware created by Singer. Between 1943 and 1945, they built about 369,000 pistols. Remington-Rand Inc.

TABLE 6-12 INTERWAR YEAR DELIVERIES OF MODEL 1911 SERIES PISTOLS, 1920–1939

Time Period	*Total Number Delivered*
1 Jan 1920–31 Dec 1925	10,000*
1 Jan 1926–31 Dec 1937	2,349
1938	1,300
1939	3,600†
TOTAL	17,249

*Mostly 1911Als.
†900 issued to the army; 2,500 to the navy.

*Bady contends in *Colt Automatic Pistols* that Singer did not build more Model 1911A1s because the army was planning to replace that handgun with the Winchester-designed .30 caliber (7.62 × 33mm) M1 Carbine, but this does not agree with the official history upon which this account is based.

FUNCTIONING AND FIRING THE MODEL 1911 & 1911A1

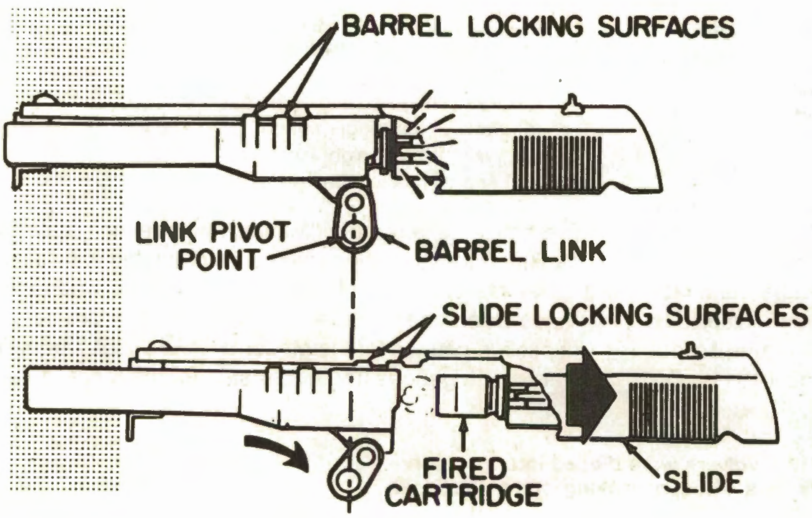


FIGURE 6–43. The .45 caliber self-loading pistols Model 1911 and Model 1911A1 are locked-breech recoil-operated weapons. The barrel and breech block (in this case, the slide) are locked firmly together until the bullet has left the barrel. When the pistol is cocked and ready to fire, the ribs or locking surfaces on the upper part of the barrel are engaged in the locking grooves in the top inside surface of the slide. At the instant of firing, the barrel and slide recoil a short distance. As they recoil, the link on the underside of the barrel pulls the breech end of the barrel free of the slide and stops its rearward travel. The slide then continues to the rear, extracting and ejecting the fired case and cocking the hammer for the next shot. The recoil spring forces the slide forward again, and as it does it strips a round from the magazine and puts it into the chamber. When the last round has been fired, the magazine follower pushes the slide stop up to catch the slide and hold it open, indicating that the gun is empty. If a fresh magazine is inserted and the slide stop is pushed down, the slide will run forward and chamber a round. (*Hoffschmidt*)

established a new factory in Syracuse, New York, to produce the Model 1911A1. Deliveries began in December 1942, and by the end of the war they had manufactured about 1,032,000 Model 1911A1s. Colt produced 520,316 pistols between 1940 and 1945. Union Switch and Signal Company of Swissvale, Pennsylvania, a subsidiary of the Westinghouse Air Brake Company and skilled in the manufacture of precise metal parts and complex assemblies for the railroad industry, was given an order in 1943 for 55,000 Model 1911A1 pistols. They delivered them in 1943, but did not receive additional contracts, however, since both Ithaca and Remington were able to exceed Ordnance Department and service requirements. When combined with Colt's output, it seemed unnecessary to maintain an additional source.

Table 6–13 summarizes by manufacturer the production of Model 1911A1 pistols during the period from 1940 to 1945. These figures put total estimated production for the period at 1,976,816, with the official figures for the post-Pearl Harbor era being 1,878,816. The difference between these two totals is probably the result of overestimating Ithaca's production. Between 1911 and 1945, the United States armed forces purchased between 2,430,856 and 2,528,930 Model 1911 and Model 1911A1 Colt Browning pistols, giving it the distinction of being the second most profusely made military handgun in the world (the European Parabellum being number one).

TABLE 6-13 PRODUCTION OF MODEL 1911A1 PISTOLS BY MANUFACTURER, 1940–1945

Company	*Years of Production*	*Number Produced*
Colt Patent Firearms Manufacturing, Hartford, Connecticut	**1940 (Dec)**	**4,693**
	1941	**35,256**
	1942	**99,367**
	1943	**112,000**
	1944	**134,000**
	1945	**135,000**
		520,316
Remington-Rand, Inc., Syracuse, New York	**1942 (Nov–Dec)**	**26,257**
	1943	**98,518**
	1944	**557,225**
	1945	**350,000**
		1,032,000
Ithaca Gun Co., Ithaca, New York	**1943 (Feb–Dec)**	**ca 161,000**
	1944	**ca 74,000**
		ca 134,000
		ca 369,000
Union Switch & Signal Co., Swissvale, Pennsylvania	**1943**	**55,000**
Singer Manufacturing Co., Elizabeth, New Jersey	**1941 (Dec)**	**500**
TOTAL		**1,976,816**

FIGURE 6–44. A pre-1940 Colt-made M1911A1 pistol with brightly blued finish. (*U.S. Army*)

FIGURE 6–45. Top, the Model 1911A1 pistol as manufactured by the Union Switch and Signal Company. *Below,* the Model 1911 as made at Springfield Armory. The Colt and Springfield Model 1911 pistols had a dull blue finish "in order that as little light may be reflected on the exterior surfaces" as possible. Between the wars, Colt put a bright blue finish on their pistols. During World War II, that kind of finish was replaced by a dull grey "Parkerized" (phosphating) technique. This finishing method was less time-consuming because components could be handled in larger batches. The matte surface of the pistols would not reflect light. (*U.S. Army*)

Wartime Model 1911A1

At the outset of the Second World War, it was discovered that most (75 percent) of the World War I-era machines, tools, and gauges stored away in 1919 were no longer suitable for production needs because of the engineering and drawing changes made to the Model 1911A1 during the 1920s and 1930s. To complicate matters, pistol production during the early days of World War II was hampered because handguns had a low priority. To expedite production, a Pistol Industry Integration Committee was established in April 1942. This body reviewed production and inspection drawings, standardized raw materials, established common subcontractors, and coordinated the acquisition of rationed tooling and machines. A Pistol Inspector's Council was set up in October 1942 to work with the committee in an effort to ensure interchangeability of components.

Interchangeability among parts made by several manufacturers was a key to repairing broken weapons on the war fronts. The first tests of parts interchangeability in December 1942 with pistols built by Colt, Remington-Rand, and Ithaca produced excellent results because the pistols made by the two new factories were essentially hand-fitted. Tests conducted in February 1943 after quantity production was underway, however, yielded considerably different results. Drawings were revised and inspection procedures altered to ensure better interchangeability. By November 1943 nearly all of the problems were eliminated and interchangeability was ensured. Quality through refinement was now the Integration Committee's main objective.[30]

While the Colt factory clung to its traditional methods of manufacturing handgun parts, the Remington-Rand and Ithaca works adopted newer practices and newer machines, both of which increased production rates, reduced labor

FIGURE 6–46. The rare Singer Manufacturing Company-made Model 1911A1. Only 500 were built. (*Krcma*)

TABLE 6-14 ORDNANCE DEPARTMENT SERIAL NUMBERS ASSIGNED TO THE MODEL 1911 AND MODEL 1911A1

Year	*Serial Number*	*Manufacturer*
1912	1–500	Colt
	501–1000	Colt USN
	1001–1500	Colt
	1501–2000	Colt USN
	2001–2500	Colt
	2501–3500	Colt USN
	3501–3800	Colt USMC
	3801–4500	Colt
	4501–5500	Colt USN
	5501–6500	Colt
	6501–7500	Colt USN
	7501–8500	Colt
	8501–9500	Colt USN
	9501–10500	Colt
	10501–11500	Colt USN
	11501–12500	Colt
	12501–13500	Colt USN
	13501–17250	Colt
1913	17251–36400	Colt
	36401–37650	Colt USMC
	37651–38000	Colt
	38001–44000	Colt USN
	44001–60400	Colt
1914	60401–72570	Colt
	72571–83855	Springfield—(These numbers reserved for Springfield)
	83856–83900	Colt
	83901–84400	Colt USMC

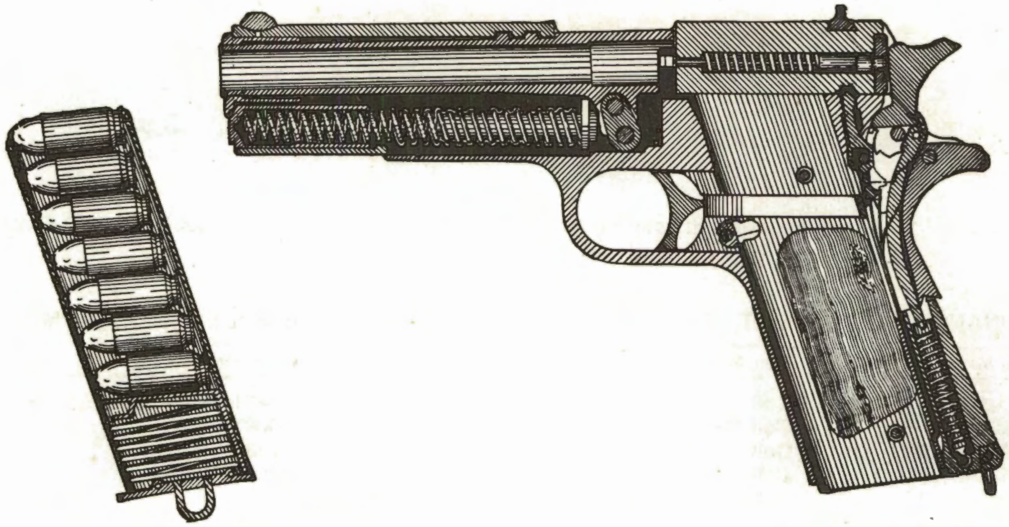
Year	*Serial Number*	*Manufacturer*
	84401–96000	Colt
	96001–97537	Colt
	97538–102596	Colt
	102597–107596	Springfield—(Reserved for Springfield)
1915	107597–109500	Colt
	109501–110000	Colt USN
	110001–113496	Colt
	113497–120566	Springfield—(Reserved for Springfield)
	120567–125566	Colt
	125567–133186	Springfield—(Reserved for Springfield)
1916	133187–137400	Colt
1917	137401–151186	Colt
	151187–151986	Colt USMC
	151987–185800	Colt
	185801–186200	Colt USMC
	186201–209586	Colt
	209587–210386	Colt USMC
	210387–215386	Colt frames (Reserved for receivers)
	215387–216186	Colt USMC
	216187–216586	Colt
	216587–216986	Colt USMC

TABLE 6-14 ORDNANCE DEPARTMENT SERIAL NUMBERS ASSIGNED TO THE MODEL 1911 AND MODEL 1911A1 *Continued*

Year	*Serial Number*	*Manufacturer*	*Year*	*Serial Number*	*Manufacturer*
1918	216987–217386	Colt USMC	1943	801001–958100	Colt
	217387–232000	Colt		958101–1088725	US&S
	232001–233600	Colt USN		1088726–1208673	Colt
	233601–594000	Colt		1208674–1279673	Ithaca
	1–13152	Rem UMC		1279674–1279698	re no AA
1919	13153–21676	Rem UMC		1279699–1441430	Remington-Rand
	594001–629500	Colt		1441431–1471430	Ithaca
	629501–700000	Unknown		1471431–1609528	Remington-Rand
1924	700001–710000	Colt	1944	1609529–1743846	Colt
1937	710001–712349	Colt		1743847–1890503	Ithaca
1938	712350–713645	Colt USN		1890504–2075103	Remington-Rand
1939	717282–717281	Colt	1945	2075104–2134403	Ithaca
1940	717282–721977	Colt		2134404–2244803	Remington-Rand
1941	721978–756733	Colt		2244804–2380013	Colt
1942	756734–800000	Colt		2380014–2619013	Remington-Rand
	S800001–S800500	Singer		2619014–2693613	Ithaca
	800501–801000	These numbers assigned to H&R			

COLT AUTOMATIC PISTOL, GOVERNMENT MODEL

SECTIONAL VIEW



METHOD OF OPERATION.

A loaded magazine is placed in the handle, and the slide drawn fully back and released, thus bringing the first cartridge into the chamber, leaving the hammer cocked and the pistol ready for firing.

If it is desired to carry the pistol fully cocked, the safety lock may be pressed upward, thus positively locking hammer and slide. The safety lock is located within easy reach of the thumb of the hand holding the pistol and may be instantly pressed down when raising the pistol to the firing position.

To lower the cocked hammer, draw it back with the thumb until it forces the grip safety in flush with the frame, at the same time pull the trigger, then lower the hammer with thumb.

SAFETY DEVICES.

It is impossible for the firing pin to discharge or even touch the primer, except on receiving the full blow of the hammer.

The pistol is provided with two automatic safety devices:

The automatic disconnector which positively prevents the release of the hammer unless the slide and barrel are in the forward position and safely interlocked; this device also controls the firing and prevents more than one shot from following each pull of the trigger.

The automatic grip safety which at all times locks the trigger unless the handle is firmly grasped and the grip safety pressed in.

The pistol is in addition provided with a safety lock by which the closed slide and the cocked hammer may be at will positively locked in position.

needs, and lowered the unit cost. Most of Ithaca and Remington-Rand's barrels were made by the High Standard Manufacturing Company or the Flanney Bolt Company. Flanney Bolt made use of machines transferred from Springfield Armory in the fall of 1943 to turn out approximately 1,000 barrels a day. High Standard at its peak also made about 1,000 Model 1911A1 barrels per day, in addition to making Model 1903 Springfield Rifle barrels.

In an Ordnance report summarizing the World War II production program, the following conclusion was presented:

> Prior to World War II, there had been a growing opinion among Ordnance people that due to the advent of new shoulder weapons, pistols and revolvers as weapons of war were obsolescent. The low priority assigned to M1911A1 Pistols at the start of the late war vividly illustrated the prevalence of that point of view. However, field experience soon demonstrated that circumstances frequently arise in either static or mobile warfare where a purely defensive weapon, dealing a "knock-down" force at close range is indispensable. Also mechanized warfare, with personnel at times crowded into confining quarters, increased the demand for a weapon which could be carried on the person at all times, and having little bulk.
>
> The M1911A1 with its simplicity of build and tremendous effectiveness at close range made it the defensive weapon par excellence.
>
> The growing recognition of the need of such a weapon of war is evidenced by the steady increase in requirements for the M1911A1 Pistol, a total of 1,878,742 having been procured during World War II.[31]

EXPERIMENTAL HANDGUNS

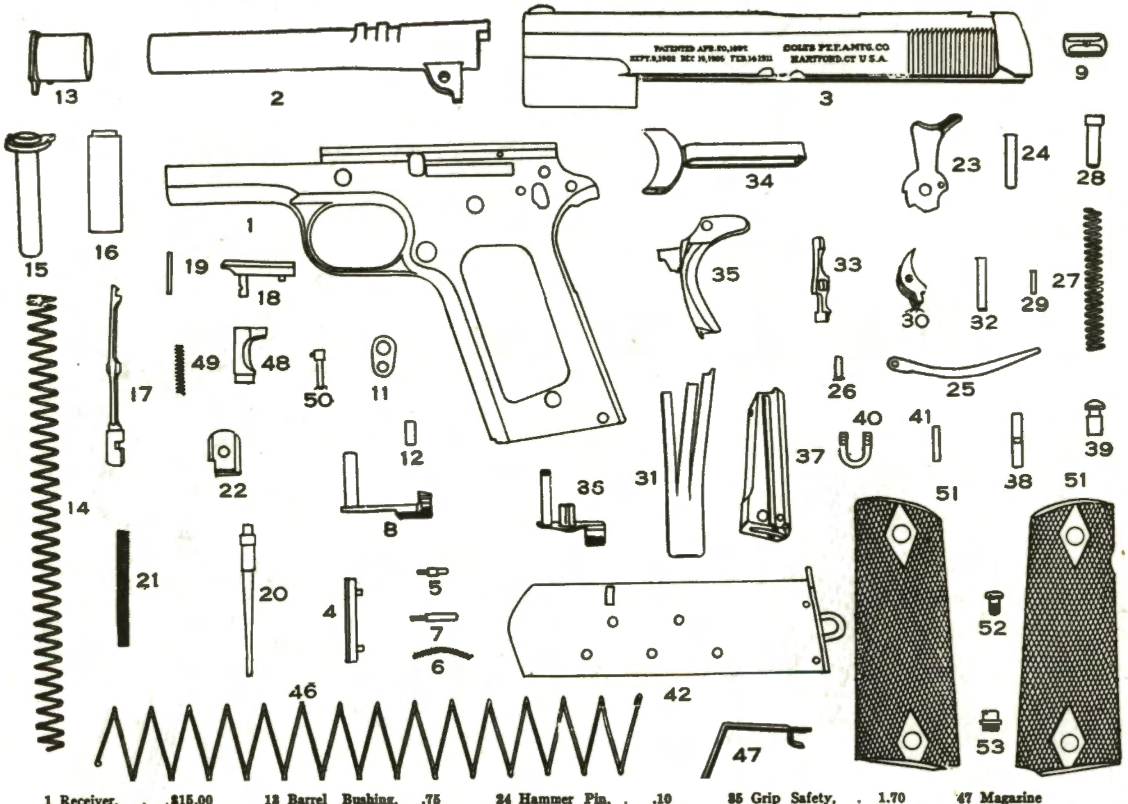
Between 1907 and 1919, the U.S. Army tested a large number of self-loading pistols. Although they all cannot be described in the limited space of this book, some of them are illustrated in the following pages to give the reader a glimpse at some of the concepts that failed.

COLT AUTOMATIC PISTOL, GOVERNMENT MODEL

NAMES AND PRICES OF

COMPONENT PARTS

Colt Automatic Pistol, Caliber .45, Government Model



1	Receiver,	$15.00
2	Barrel,	3.75
3	Slide,	9.00
4	Plunger Tube,	.75
5	Slide Stop Plunger,	.10
6	Plunger Spring,	.10
7	Safety Lock Plunger,	.10
8	Slide Stop,	1.20
9	Rear Sight,	.50
*10	Front Sight,	.15
11	Link,	.20
12	Link Pin,	.10
13	Barrel Bushing,	.75
14	Recoil Spring,	.15
15	Recoil Spring Guide,	.45
16	Plug,	.15
17	Extractor,	.35
18	Ejector,	.60
19	Ejector Pin,	.10
20	Firing Pin,	.35
21	Firing Pin Spring,	.10
22	Firing Pin Stop,	.45
23	Hammer,	1.50
24	Hammer Pin,	.10
25	Hammer Strut,	.25
26	Hammer Strut Pin,	.10
27	Main Spring,	.10
28	Main Spring Cap,	.10
29	Main Spring Cap Pin,	.10
30	Sear,	1.00
31	Sear Spring,	.30
32	Sear Pin,	.10
33	Disconnector,	.30
35	Trigger,	1.50
35	Grip Safety,	1.70
36	Safety Lock,	1.50
37	Main Spring Housing,	1.50
38	Housing Pin,	.10
39	Housing Pin Retainer,	.10
40	Lanyard Loop,	.10
41	Lanyard Loop Pin,	.10
42	Magazine Complete,	1.25
46	Magazine Spring,	.20
47	Magazine Follower,	.10
48	Magazine Catch,	.60
49	Magazine Catch Spring,	.10
50	Magazine Catch Lock,	.15
51	Stocks, right and left hand, pr.,	2.00
52	Stock Screws (4), each,	.10
53	Screw Bushings (4), each,	.10

* This part shown attached to Slide. Partridge Type Sights, Front .75, Rear 1.00.

FIGURE 6–48. Component parts for the Model 1911 pistol. The prices reflect the market in 1925. (*Colt*)

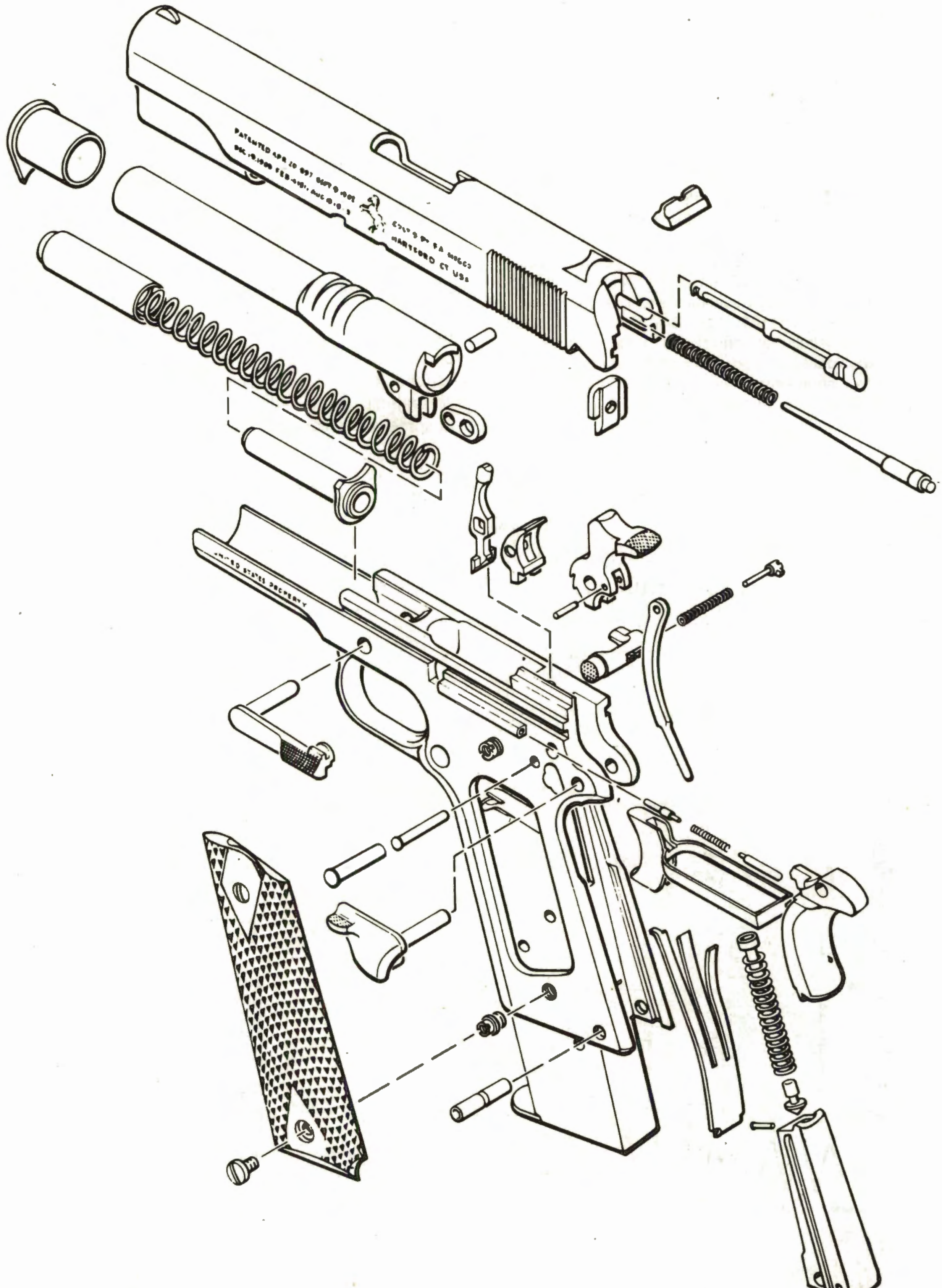
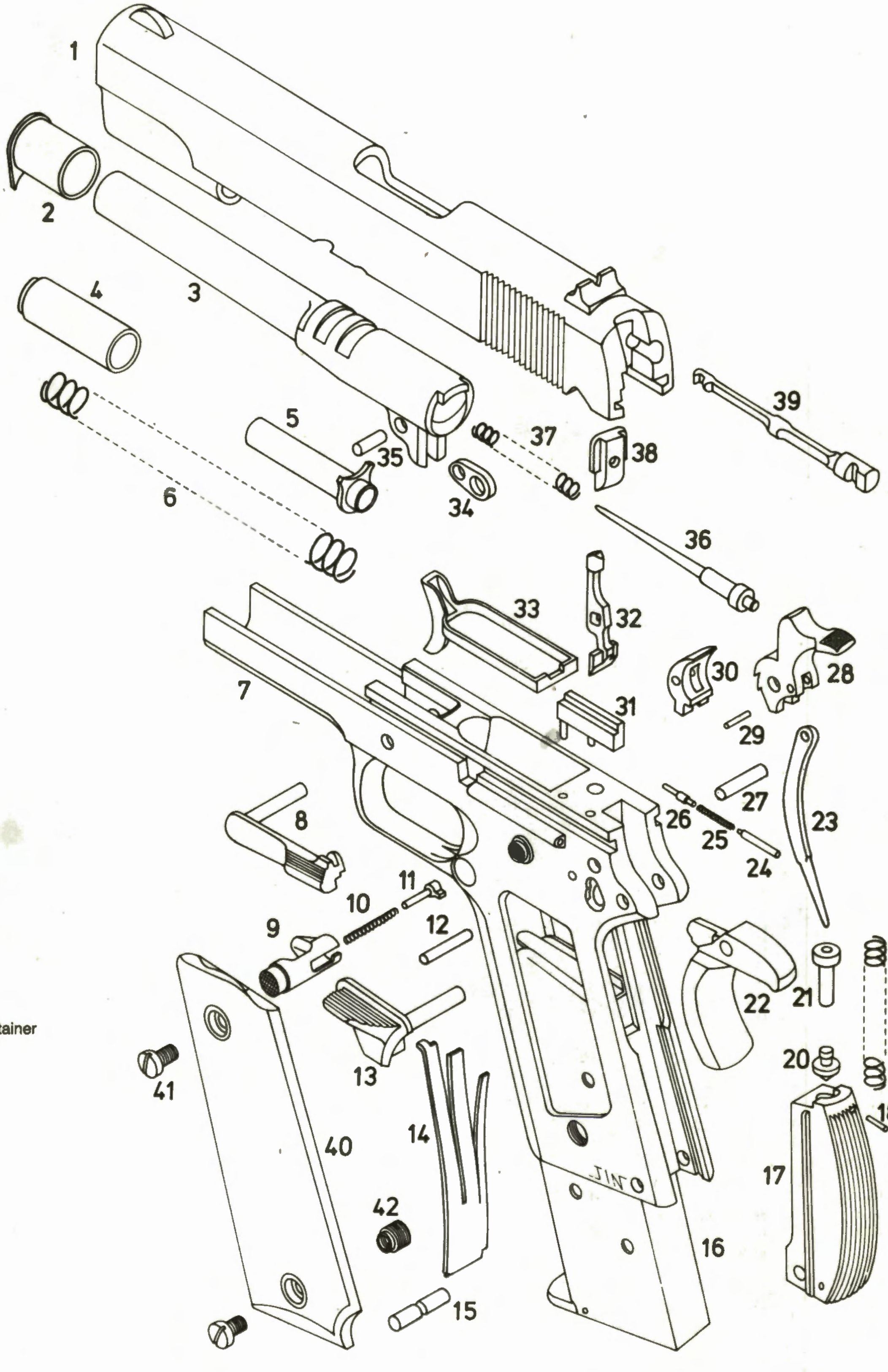


FIGURE 6–49. An exploded view of the Colt Model 1911 pistol. (*Hoffschmidt*)



1. Slide
2. Barrel bushing
3. Barrel
4. Plug
5. Recoil spring guide
6. Recoil spring
7. Frame (receiver)
8. Slide stop
9. Magazine catch
10. Magazine catch spring
11. Magazine catch lock
12. Sear and disconnector pin
13. Safety
14. Sear spring
15. Mainspring housing pin
16. Magazine
17. Mainspring housing
18. Mainspring cap spring
19. Mainspring
20. Mainspring housing pin retainer
21. Mainspring cap
22. Grip safety
23. Hammer strut
24. Safety catch plunger
25. Plunger spring
26. Slide stop plunger
27. Hammer spring
28. Hammer
29. Sear pin
30. Sear
31. Ejector
32. Disconnector
33. Trigger
34. Barrel link
35. Barrel link pin
36. Firing pin
37. Firing pin spring
38. Firing pin retaining plate
39. Extractor
40. Grip plate
41. Grip plate screw bushing
42. Grip plate screw bushing

FIGURE 6–50. An exploded view of the Colt M1911A1 pistol. (*Jimbo*)

FIGURE 6–51. Bernhard Müller submitted this 7.65mm Parabellum caliber pistol to the U.S. Army for trial in 1905. It had a 139-millimeter barrel (rifling twist 4 right) and measured 237.5 millimeters overall. It weighed 1,020 grams, and came equipped with an eight-shot magazine. The testing officers rejected it because of its weak firing pin, uncertain ejection, and side-mounted ejection port. A .45 caliber (11.43mm) model was proposed but never delivered. (*Krcma*)

FIGURE 6–52. The Philips gas-operated .45 caliber (11.43mm) pistol was developed by Captain W. A. Philips at Springfield Armory during the period between June 1907 and July 1910. Work on this design was terminated upon the adoption of the Model 1911. (*Krcma*)

FIGURE 6–53. The .45 caliber (11.43mm) Parabellum designed by Georg Luger. Only two or three of these pistols were built by DWM. (*U.S. Army*)

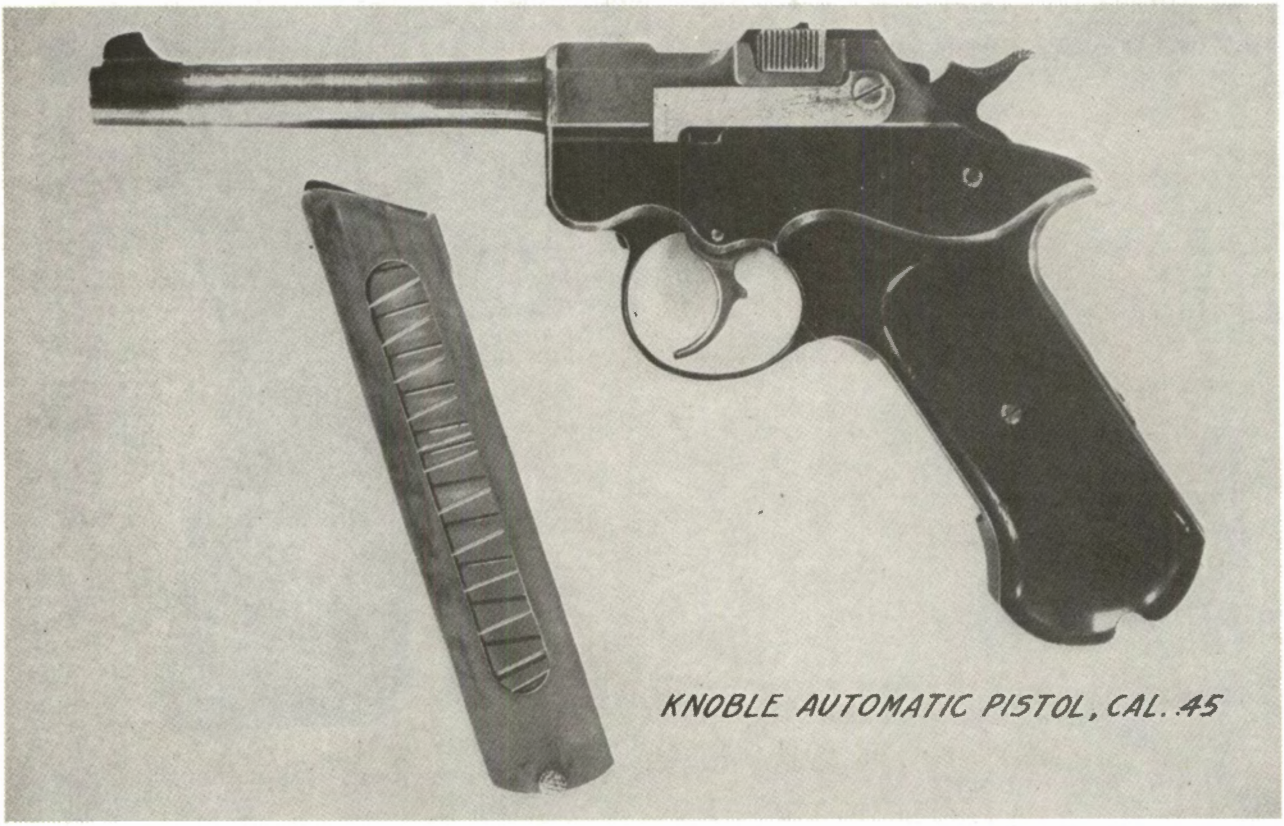


FIGURE 6–54. This 1907 trial pistol one was designed by William B. Knoble of Takoma, Washington. It was rejected because the prototype was too crudely made to work properly. (*U.S. Army*)

FIGURE 6–55. The .45 caliber (11.43mm) 1905 White-Merrill self-loading pistol. (*Krcma*)

FIGURE 6–56. The .45 caliber (11.43mm) 1907 White-Merrill self-loading pistol had a 152-millimeter barrel (rifling twist 6 right), with an overall length of 215 millimeters. It weighed 1,086 grams. It had a 10-shot magazine. Note that this pistol was designed to be cocked with one hand, thus overcoming a major cavalry objection to self-loaders. (*Krcma*)

FIGURE 6–57. The Grant-Hammond and High-Standard .45 caliber (11.43mm) pistols are very similar and are probably the work of the same designer. Both date from the World War I period, with the Grant-Hammond appearing first. The Grant-Hammond weighed 1,190 grams with an overall length of 299 millimeters and a barrel length of 172 millimeters. It had an eight-shot magazine. (*Visser, Smithsonian, Krcma*)

MADE BY THE HIGH STANDARD MFG.CO.
NEW HAVEN, CONN.
UNITED STATES OF AMERICA
.45 CAL.
PAT. PENDING
CENTIMETERS

FIGURE 6–58. The Schouboe pistol manufactured by the Dansk-Rekylriffel-Syndikat of Copenhagen, Denmark, was created by Jens Schouboe, who is best known as the designer of the Madsen light machine gun. He began work on this pistol between 1902 and 1903 and submitted this .45 caliber (11.35mm) model for the American trials in 1907. It had a 100-millimeter barrel (rifling twist 6 right), measured 226 millimeters overall, and weighed 1,110 grams. It came with a six-shot magazine. This pistol was unique because it shot a light aluminum projectile. Schouboe used such a bullet so that he could design his pistol with a simple blowback action. (*Krcma*)

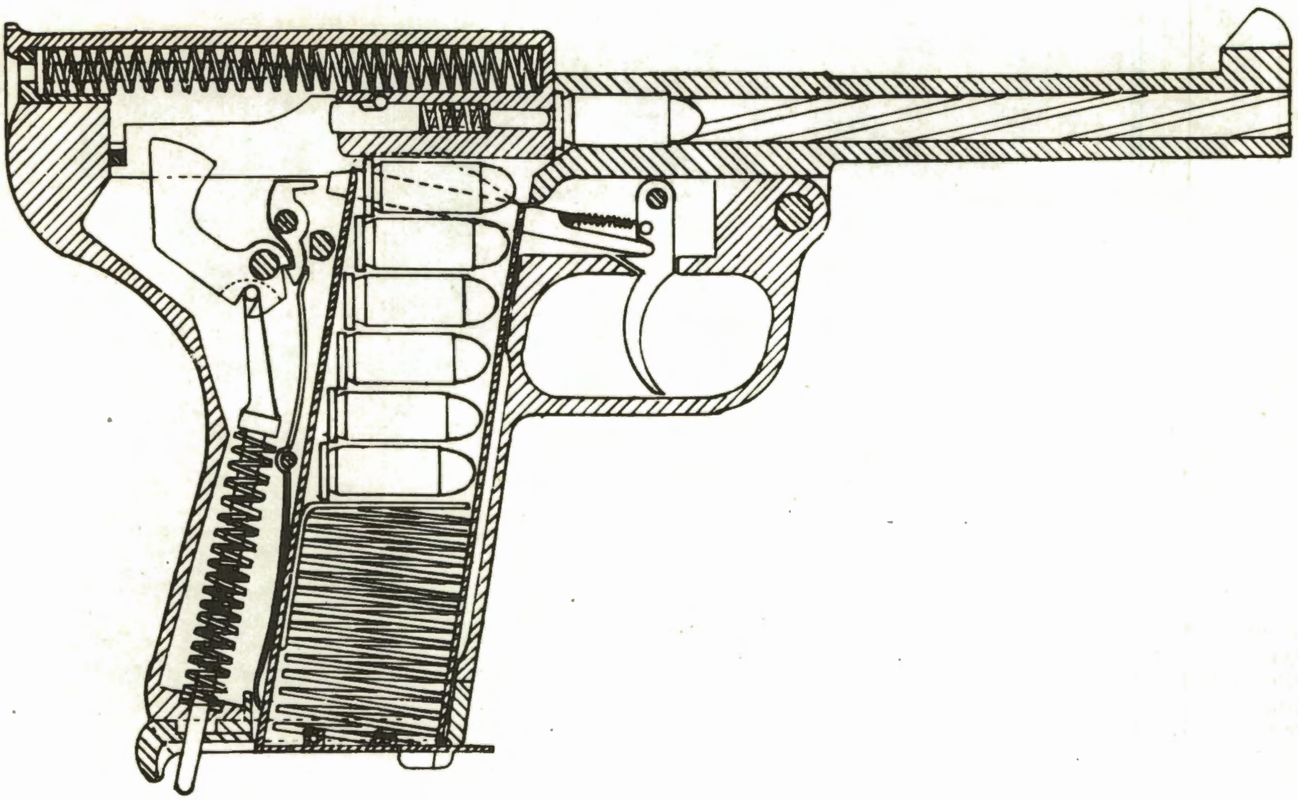


FIGURE 6–59. An August 1910 drawing of the Schouboe pistol mechanism. (*Tøjhusmuseet*)

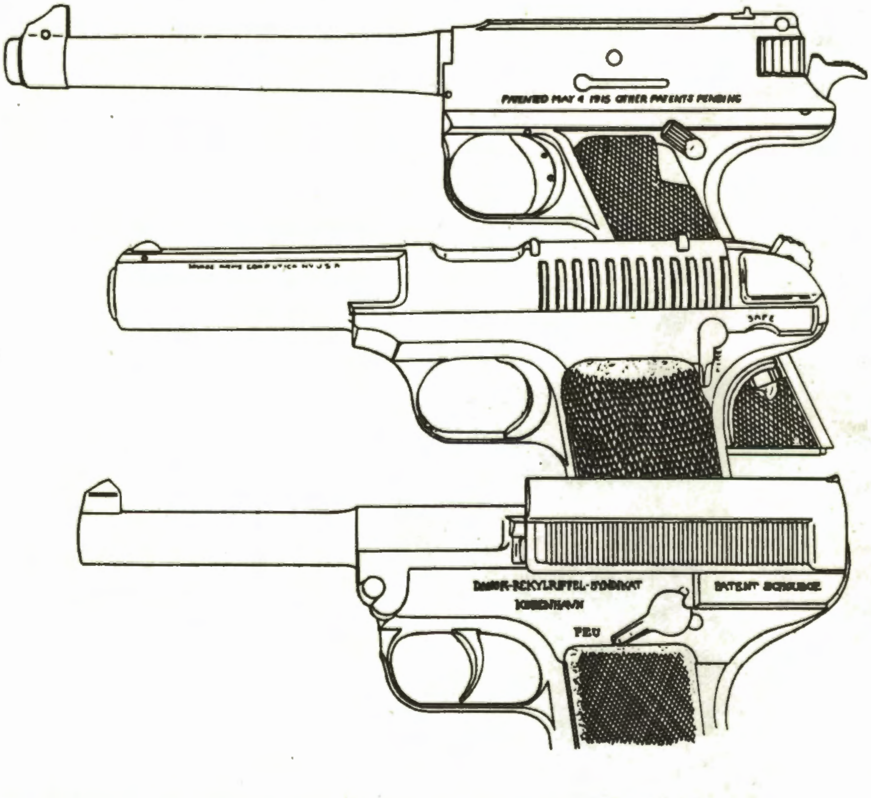


FIGURE 6–60. *Top to bottom,* the Grant-Hammond, Savage, and Schouboe pistols drawn to the same scale. (*Marsh*)

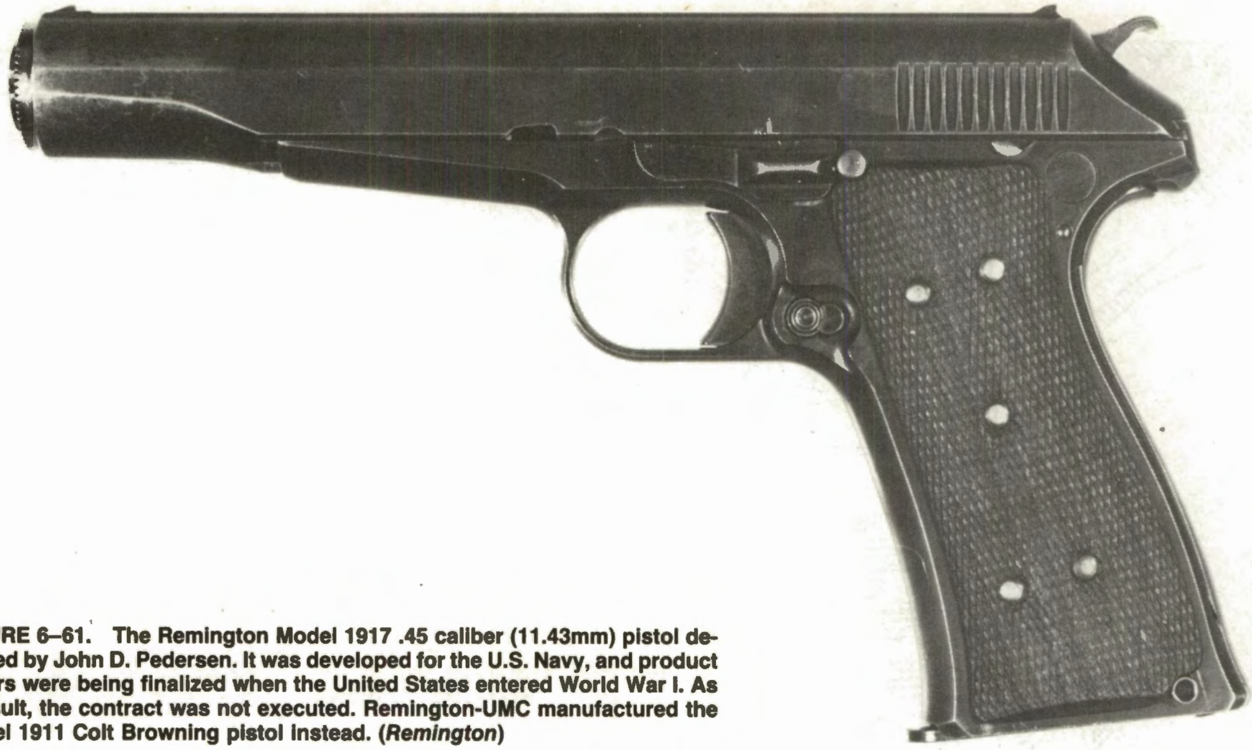


FIGURE 6–61. The Remington Model 1917 .45 caliber (11.43mm) pistol designed by John D. Pedersen. It was developed for the U.S. Navy, and product orders were being finalized when the United States entered World War I. As a result, the contract was not executed. Remington-UMC manufactured the Model 1911 Colt Browning pistol instead. (*Remington*)

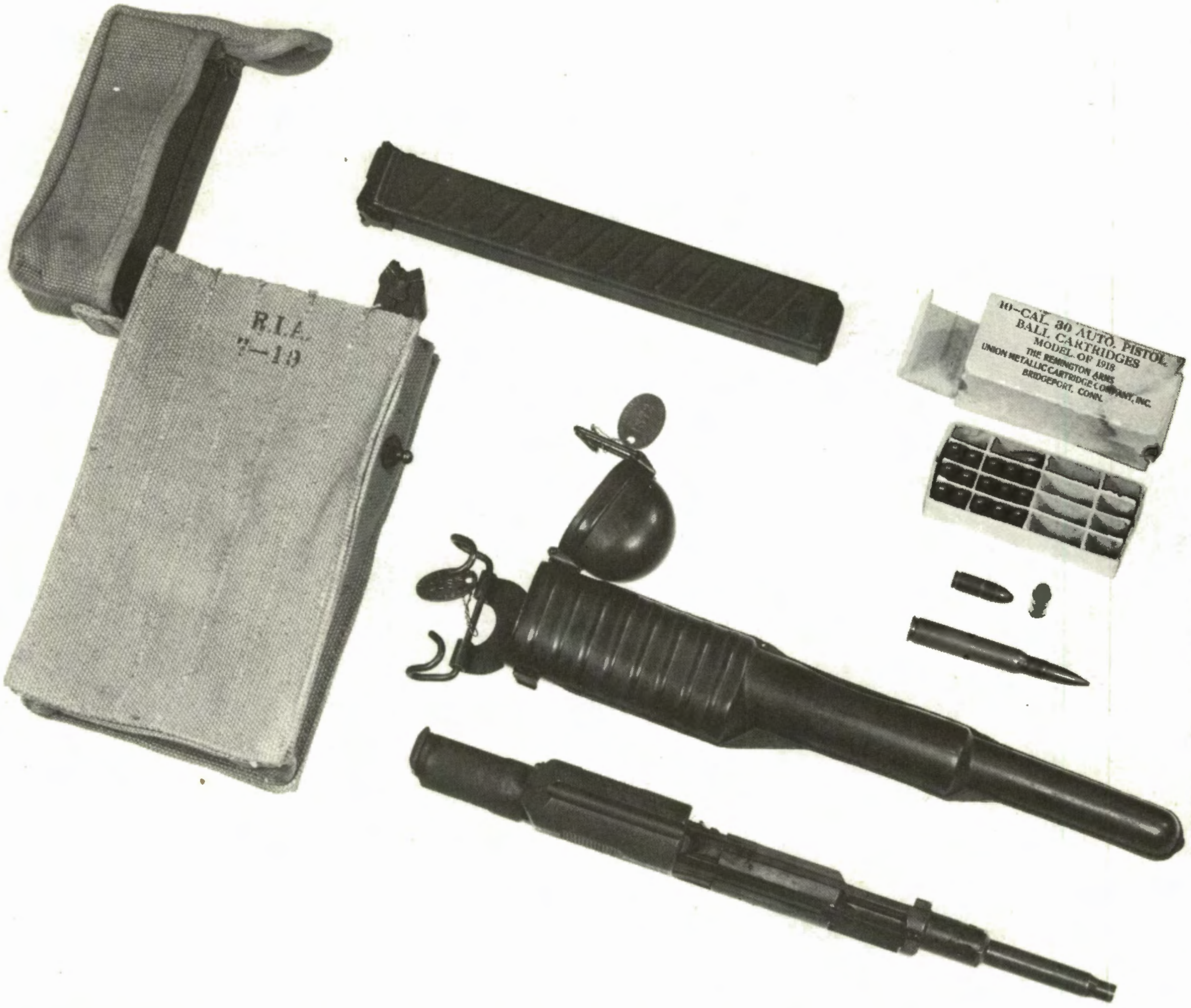


FIGURE 6–62. John D. Pedersen is better known for his pistol that was not a pistol. The official nomenclature for the Pedersen device was *Automatic Pistol, Caliber .30, Model of 1918.* It was a device for converting the Model 1903 Springfield from bolt-action to self-loading operation. The "pistol" designation was an attempt to confuse German intelligence during World War I. The .30 caliber (7.65mm) Pedersen cartridge was later used by the French in their Modèle 1935 pistol. (*U.S. Army*)

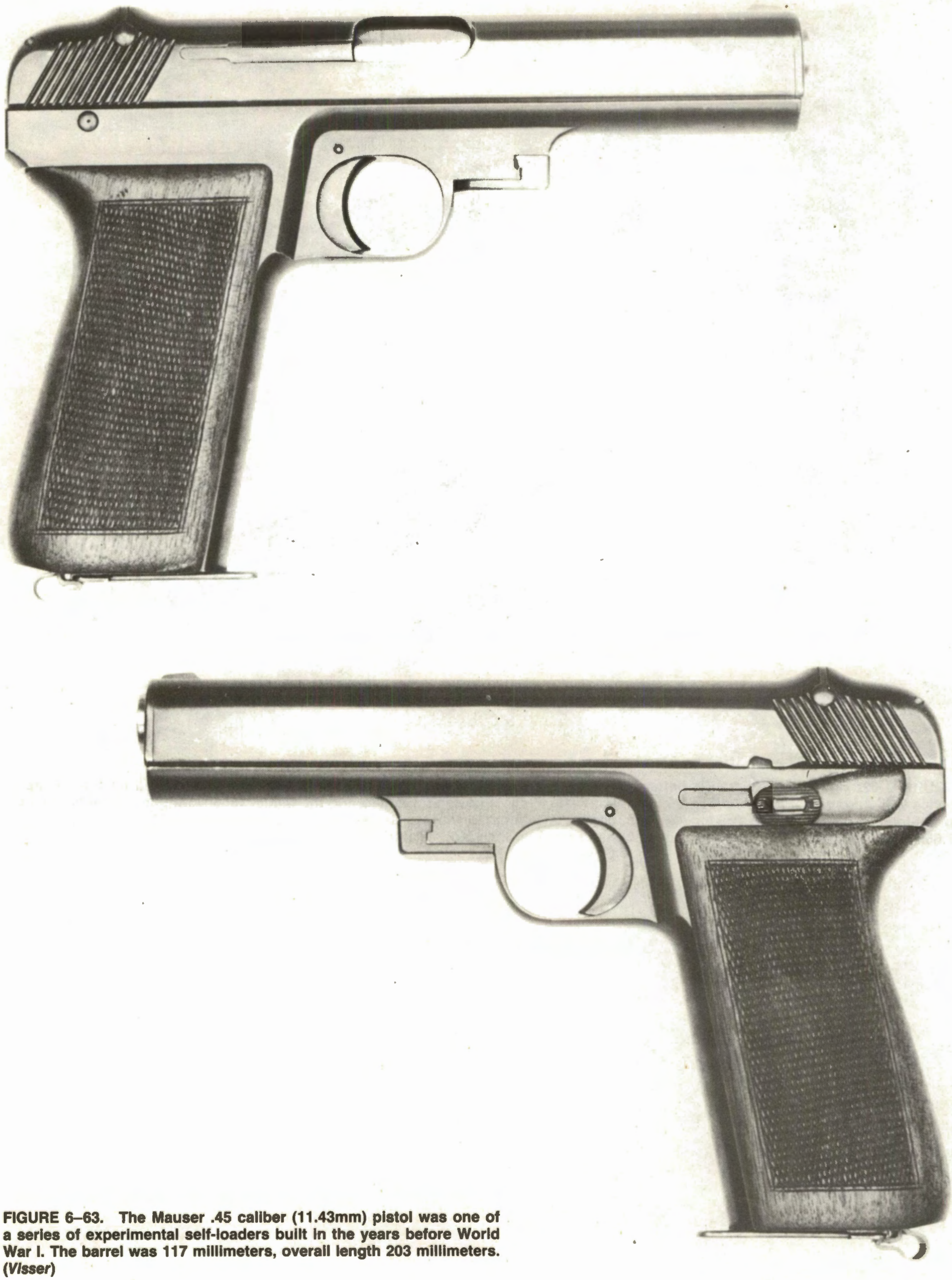


FIGURE 6–63. The Mauser .45 caliber (11.43mm) pistol was one of a series of experimental self-loaders built in the years before World War I. The barrel was 117 millimeters, overall length 203 millimeters. (*Visser*)

Notes

1 War Dept., *Annual Reports of the War Department for the Fiscal Year Ended June 30, 1900,* vol. 3, *Report of the Chief of Ordnance,* appx. 15, "Report of Board of Officers on Tests of Automatic Pistols" (Washington: GPO, 1900), pp. 177–94; Donald B. Bady, *Colt Automatic Pistols* (Alhambra, CA: Borden Publishing Co., 1973), pp. 60–63ff, 81–94; and letter, John E. Greer to Frank H. Phipps, 6 Sept. 1899, O.O. file 33735/1 and letter Greer to Phipps, 2 March 1900, O.O. file 33735/2, Records, Off. Chief of Ordnance, Record Group 156, National Archives.

2 Letter, Phipps to A. R. Buffington, 8 May 1900, O.O. file 33735/4; letter, Phipps to Buffington, 12 May 1900, O.O. file 33735/5; letter, Phipps to Buffington, 19 May 1900, O.O. file 33735/8; letter, Phipps to Buffington, 26 May 1900, O.O. file 33735/9; letter, Phipps to Buffington, 2 June 1900, O.O. file 33735/10; letter Robert Alexander to Ordnance Officer, Dept. of Puerto Rico, 20 July 1900, O.O. file 33735/30; letter H. W. Wheeler to Ordnance Officer, Dept. of Puerto Rico, 6 Oct. 1900, O.O. file 33735/13; letter, Lawson M. Fuller to Buffington, 2 Oct. 1900, O.O. file 33735/32; 2d endorsement by Phipps to O.O. file 33735, encl. 12 with encls. 13–31, 16 Nov. 1900; "A Synopsis of Reports Made by Officers of the Fourth Cavalry, U.S.A. on the Colt's Automatic Pistol, Cal. .38" [1 Oct. 1903], O.O. file 33735/190, encls. 1–14; and "Summary of Reports Received on Colt's Automatic Pistols Issued in the Division of the Philippines," 21 May 1903, O.O. file 33735/204, encl. 23.

3 Bady, *Colt Automatic Pistols,* pp. 95–138.

4 Louis A. LaGarde, *Gunshot Injuries: How They Are Inflicted, Their Complications and Treatment,* 2d rev. ed. (New York: William Wood and Co., 1916), pp. 64–91; and Julian S. Hatcher, *Textbook of Pistols and Revolvers: Their Ammunition, Ballistics and Use* (Plantersville, SC: Small-Arms Technical Publishing Co., 1935), pp. 417–28.

5 Bady, *Colt Automatic Pistols,* pp. 139–53.

6 Letter, William Crozier to Samuel Merrill, 13 Feb. 1906, O.O. file 13092/466, RG 156, was typical of the letters sent.

7 "Report of Board on Tests of Revolvers and Automatic Pistols, in War Dept., *Annual Reports, 1907,* vol. 6, *Report of the Chief of Ordnance* (Washington: GPO, 1907), pp. 83–116.

8 Ibid., p. 94.

9 Ibid., p. 95.

10 Ibid., pp. 28–29, 90; W. H. J. Chamberlain, "Arms for the Philippine Constabulary," *American Rifleman* (Jan. 1980): 26–27, 84–85; and John A. Kopec, "The Colt Artillery Model Single Action," *American Rifleman* (May 1976): 30–32.

11 Letter, John T. Thompson to Colt, 17 Dec. 1908, O.O. file 13092/1161; letter, F. C. Nichols to Thompson, 18 Dec. 1908; letter, Thompson to Colt, 19 Dec. 1908, O.O. file 13092/1164; and letter, A. L. Ulrich to Thompson, 21 Dec. 1908.

12 Letter, Crozier to the Adjutant General, 18 May 1907, O.O. file 13092/829; letter Fuller to Hans Tauscher, 9 Jan. 1908, O.O. file 13092/938; and letter, Crozier to Savage, 9 Aug. 1907, O.O. file 13092/888.

13 Letter William J. Green to Crozier, 13 Aug. 1907, O.O. file 13092/889; letter, Fuller to Savage, 23 Aug. 1907, O.O. file 13092/896; letter, Savage to Crozier, 21 Oct. 1907; and Daniel K. Stern, *10 Shots Quick: The Fascinating Story of the Savage Pocket Automatics* (San Jose, CA: Globe Printing Co., 1967).

14 Letter, Green to Crozier, 5 Nov. 1908.

15 Letter, F. R. McCoy to the Adjutant General's Office, 30 July 1909, O.O. file 13092/1407.

16 "Proceedings of the Cavalry Board," 6 May 1910, O.O. file 13092/1652, encl. 1.

17 Letter, James S. Sherman to Crozier, 17 June 1910, O.O. file 13092/1753; letter, Crozier to Sherman, 18 June 1910, O.O. file 13092/1754; and letter, Thompson to Savage, 18 June 1910, O.O. file 13092/1755.

18 Letter, Lt. Burnett to the Adjutant General's Office, 28 March 1909, O.O. file 13092/1252; and letter, Lt. Burnett to the Adjutant General's Office, 20 July 1909, O.O. file 13092/1393.

19 Letter, Thompson to S. E. Blunt, 20 Aug. 1909, O.O. file 13092/1416; and "Proceedings of a Board of Officers," 3 Sept. 1909, encl. to O.O. file 13092/1416.

20 O.O. file 13092/1579, encl. 1; and "Report of the School of Musketry on the Colt's Automatic Pistol, Model 1909," 3 April 1910, O.O. file 13092/1583, encl. 2.

21 "Report of the School of Musketry."

22 Bady, *Colt Automatic Pistols,* p. 185.

23 Letter, Thompson to Colt, 28 April 1910, O.O. file 13092/1699.

24 Bady, *Colt Automatic Pistols,* p. 188.

25 "Proceedings of a Board of Officers," 10 Nov. 1910, O.O. file 13092/1921, encl. 1.

26 "Proceedings of a Board of Officers," 20 March 1911, O.O. file 13092/1956, encl. 1.

27 Letter, Ordnance Office to Colt, 29 March 1911, O.O. file 13092/2044.

28 Roy G. Jinks, *History of Smith & Wesson: Nothing of Importance Will Come without Effort* (North Hollywood, CA: Beinfeld Publishing Co., 1977), pp. 203–05; Bady, *Colt Automatic Pistols,* p. 242; and Sevellon Brown, *The Story of Ordnance in the World War* (Washington: James William Bryan Press, 1920), pp. 130–32.

29 Annie J. Gregg, "Project Supporting Paper relating to Pistol, Automatic, Caliber .45, M1911A1, 1917 through August 1945," PSP 39, p. 9, prepared for Small Arms Div., Industrial Service, Ordnance Dept., 31 Jan. 1947, National Archives Record Group 156; and Bady, *Colt Automatic Pistols,* p. 272.

30 Gregg, "Project Supporting Paper," pp. 13–14.

31 Ibid., p. 18.

7 AUSTRIAN HANDGUNS 1900 TO 1945

Four names dominated the Austrian handgun scene at the beginning of this century—Krnka, Roth, Frommer and Mannlicher. These men created the self-loading pistols used by the Austro-Hungarian armies. The arms industry of the Dual Monarchy was concentrated in two locations; Steyr in what is now Austria and Budapest in what is now Hungary. The men involved in the creation of small arms often moved back and forth between these two centers.

KAREL KRNKA

Karel (Carl) Krnka was one of the more active firearms designers of the old empire. Born to arms designer Sylvester Krnka on 6 April 1858, in Volyne, Bavaria (Velký Varadin), Karel's early design work was carried out while he was still an infantry officer in the Imperial Army. These first designs involved improvements to existing weapons, such as his "rapid-loading auxiliary magazine," a cartridge holder that facilitated the loading of single-shot military rifles. In 1884, he devised an improved version of the Werndl rifle used by the Austro-Hungarian armed forces. Upon cocking the new weapon, the breech opened and the fired cartridge was ejected automatically. In the late 1880s, Karel and his father collaborated on the development of a bolt action, breech-loading rifle. In competitive service trials, this design lost out to the Steyr-Mannlicher rifle created by Ferdinand Ritter von Mannlicher. Karel is also reported to have worked with the Nagant brothers of Liège while they developed the 1891 rifle (Mosin-Nagant) for the Russians.

In 1887, Karel Krnka left the military service and shortly thereafter moved to Birmingham, England, where he became the chief engineer at the Gatling Gun and Ammunition Company. During the following year, he established the Krnka Repeating Arms Company, Ltd. in London. After four years, Krnka returned to Prague and established a patent office there. Seven years later in 1898, he joined Georg Roth's ammunition company in Vienna, where he remained for a decade. While employed by the Roth firm, all of his patents were in his name and that of Georg Roth.

Krnka's first handgun, a mechanical repeater similar in concept to the Schulhof, appeared in 1886. His first self-loading pistol was patented in 1898, with additional coverage in 1910. A third individual, Rudolf Frommer (born 4 August 1868), an engineer at the Fegyver és Gépgyár Részvénytarsaság (Small Arms and Machine Factory, Ltd.) in Budapest, also appears to have contributed to this pistol design. As a result, there is confusion about who contributed what to the creation of the 1895 Krnka-Roth pistol. Prototypes of this handgun were tested by the Swiss military in 1898, and although this first pistol did not lead anywhere itself, two other designs did evolve from it—the Roth-Steyr and the Frommer 1901.

Roth-Steyr Pistol

The Roth-Steyr was the first self-loading pistol to be adopted by a major European army; the Swiss adopted the Parabellum in 1900, and the Belgians adopted the FN-Browning Modèle 1900 in that year. Krnka's pistol, which has been known since its introduction as the Roth-Steyr, was protected by the following British patents: 10,601 (1899), 5,223 (1900), 14,123 (1900), and 6,048 (1908). It was adopted in 1907 as the *Repetier Pistole M. 07* for the Austro-Hungarian cavalry. During the 1914 to 1918 war it was issued to other units of the Kaiserliche und Königliche Armee (K u. K), one of three armies comprising the ground forces of the Empire. Other forces used the Steyr Model 1912, while the Hungarian Militia (Honved) officers carried the 7.65mm Frommer. The Roth-Steyr pistol was manufactured by both of the major arms makers in the Empire—the Österreichische Waffenfabrik Gesellschaft, Steyr (OWG) and the Fegyver és Gépgyár Rézvénytarsaság in Budapest (Fegyvergyar).

The Roth-Steyr pistol operating mechanism had a locked breech with a recoiling and rotating barrel. Two pairs of symmetrically opposed lugs were milled on the barrel: one pair near the muzzle and one pair mid-barrel. The pair of lugs near the muzzle engaged a helical slot cut into the nose cap (barrel bushing), causing the barrel to rotate 90 degrees during the first 12.7mm of the recoil stroke. After the barrel had rotated 90 degrees, the slide was freed to continue its recoil to the rear. The rear pair of lugs was considerably larger, and they engaged a helical slot cut into the slide, which was a heavy tubular piece. The forward portion of the slide housed the barrel, while the rear half contained the striker and ejector. The Roth-Steyr did not have a removable magazine, the feed device was an integral part of the weapon and was loaded with a special ten-cartridge charger clip. A lever on the left side of the frame acted both as a slide release and as a follower release.

Another unique feature of the Roth-Steyr pistol was its trigger mechanism. The trigger had to be pulled to complete the cocking of the striker-type firing pin. Under the continued pressure of the finger on the trigger, the striker was drawn further to the rear so that the sear could be tripped and the striker allowed to fly forward. After each shot the cocking knob had to be pulled to the rear to recock the pistol. Although a very safe pistol for cavalrymen to carry, the gun was difficult to shoot because of its awkward cocking system and its heavy trigger pull.

FIGURE 7–1. This 8mm Model 1895 Krnka-Roth pistol, serial number 59, was tested by the Swiss in 1898. (*Waffenfabrik Bern*)

An estimated 90,000 Modell 1907 Roth-Steyr pistols were built during its five years of manufacture. Nearly twice as many Modell 1907s were built at the OWG, Steyr factory (ca. 60,000) as were made at the Fegyvergyar in Budapest (ca. 30,000). Components fabricated at the OWG were marked with a *K,* and those produced in Budapest have an *R.* Modell 1907s also were stamped with government marks; either *W–n,* or *B–p,* followed by the Austrian double eagle or the coat of arms of Hungary and the date of issue. Regimental markings were stamped onto a brass disk inlaid into the right grip. The Modell 07 was a difficult handgun to manufacture, because the frame, which started out as a lump of forged steel, required numerous intricate machining operations. These expensive operations drove up the cost, and eventually led the Austrian government to terminate production.

FROMMER PISTOLS

Budapest Frommer pistols were quite similar in concept to the 1895 Krnka-Roth handgun. Like the Modell 07, Frommer's pistols were exquisite pieces of machinery, but they also were difficult and expensive to manufacture. Protected by British patent (20,362, 1901), the Modell 1901 appeared in 1903 and was submitted for military trials in Sweden, the United States, the United Kingdom, Spain, and Austria. In the 1901 model pistol, the 10-shot feed device was an integral part of the pistol, the weapon being loaded by a separate charger clip. This Frommer design had a long stroke recoil that operated the rotating bolt head. Most of what appeared to be a barrel was in fact a jacket around the barrel; the barrel protruded about 25mm out of the end of the jacket.

In 1906, Frommer introduced a modified version of the Modell 1901. Apart from some changes made to make manufacture easier, the major differences were a switch from the 8mm (8mm Roth-Steyr) cartridge to the 7.65mm Frommer cartridge and the use of a detachable magazine.

In 1910, a new model was introduced, Modell 1910, which had a grip safety, modified hammer profile, and was chambered to fire the increasingly popular 7.65mm Browning cartridge. Production of the 1910 model Frommer was terminated in 1914 when the European war began. Accurate estimates of the number manufactured are not presently available.

Frommer Stop Pistol

This rotating bolt pistol, made both in 7.65mm and 9mm Browning calibers, first appeared in 1912 (British patent 10,566, 1912). It too was the work of Rudolf Frommer, and large numbers were employed by the Honved during the 1914 to 1918 war. After that these handguns were issued as the official service pistol of the new independent Hungarian army. As late as 1945, some Hungarian police officers were still carrying the Frommer Stop pistols.

Its double spring system above the barrel was the single most interesting design feature of the Frommer Stop. Housed in a tunnel above the barrel, the rear spring controlled the operation of the bolt, while the forward one absorbed the recoil of the barrel and acted as the return spring. Two springs of this type are usually required for handguns, which have

FIGURE 7–2. Another 8mm Model 1895 Krnka-Roth pistol, serial number 61. This pistol had a 51mm barrel, was 250mm overall, and weighed about 650 grams. (*Visser*)

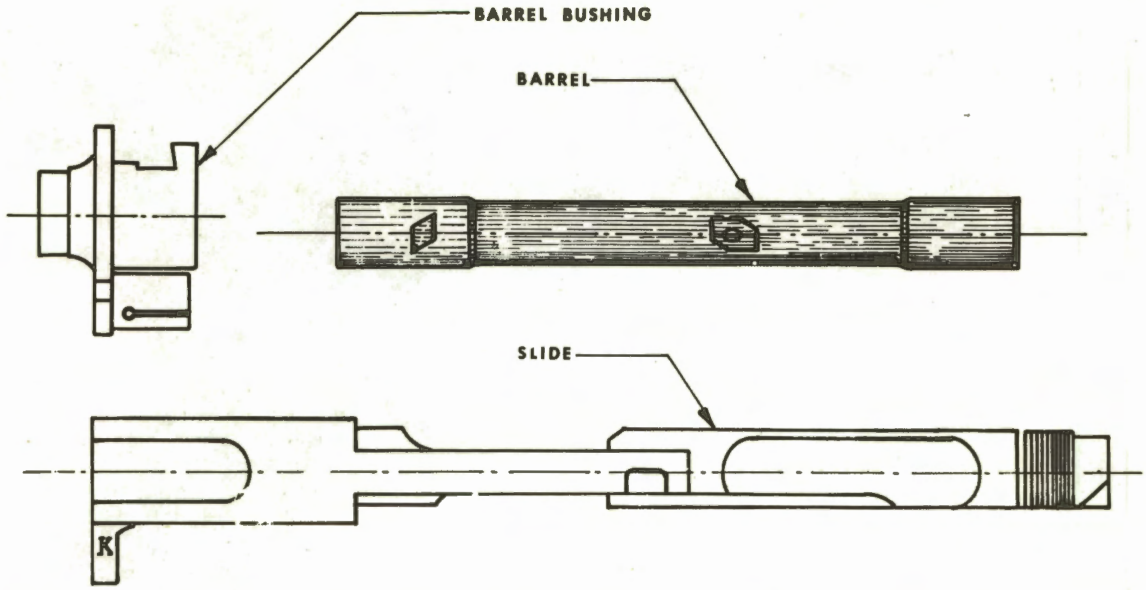


FIGURE 7–3. The barrel, barrel bushing (nose cap), and slide of the Roth-Steyr self-loading pistol. (*Simmons*)

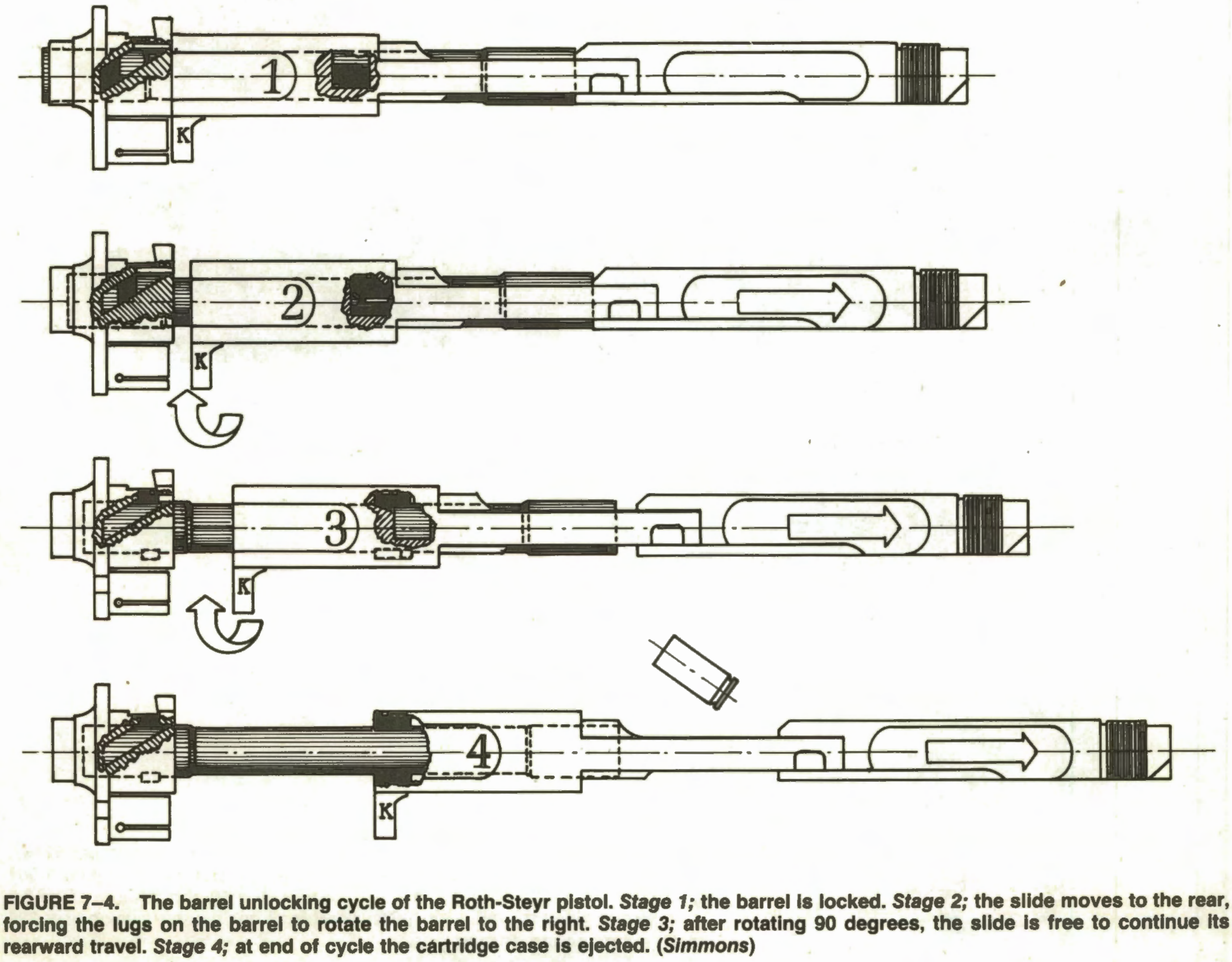
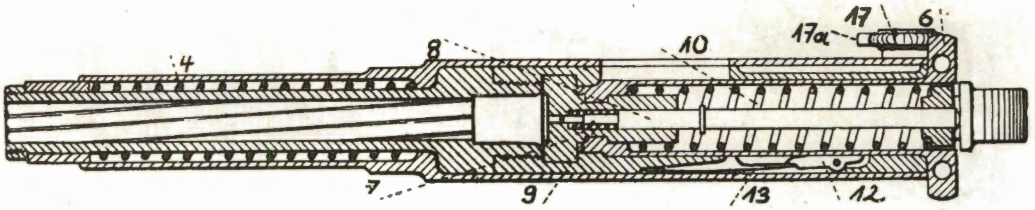
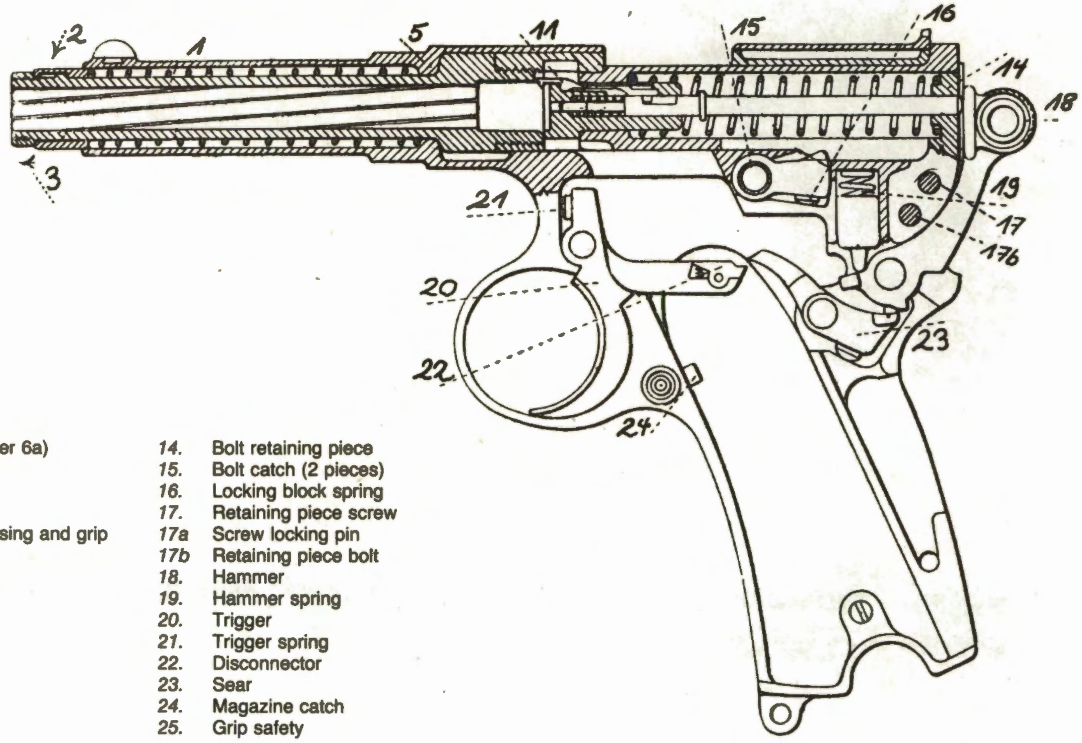


FIGURE 7–4. The barrel unlocking cycle of the Roth-Steyr pistol. *Stage 1;* the barrel is locked. *Stage 2;* the slide moves to the rear, forcing the lugs on the barrel to rotate the barrel to the right. *Stage 3;* after rotating 90 degrees, the slide is free to continue its rearward travel. *Stage 4;* at end of cycle the cartridge case is ejected. (*Simmons*)

FIGURE 7–5. The 8mm Modell 1907 Roth-Steyr pistol serial number 52467. This pistol had a 128mm barrel, was 232.5mm overall and weighed 1,004 grams. It had 4 right rifling and was loaded with a 10-shot charger. The 6.9 gram projectile of the 8mm Roth-Steyr cartridge had a muzzle velocity of 320 meters per second. (*Krcma*)

FIGURE 7–6. The 7.65mm Frommer Model 1906 pistol. This pistol had a 159mm barrel, was 275mm overall, and weighed about 640 grams. (*Visser*)





1. Barrel (screwed into carrier 6a)
2. Barrel bushing
3. Barrel nut
4. Barrel return spring
5. Barrel jacket, breech housing and grip frame
6. Bolt
6a. Bolt carrier
7. Bolt head
8. Firing pin
9. Firing pin spring
10. Bolt return spring
11. Extractor
12. Ejector
13. Ejector spring
14. Bolt retaining piece
15. Bolt catch (2 pieces)
16. Locking block spring
17. Retaining piece screw
17a Screw locking pin
17b Retaining piece bolt
18. Hammer
19. Hammer spring
20. Trigger
21. Trigger spring
22. Disconnector
23. Sear
24. Magazine catch
25. Grip safety

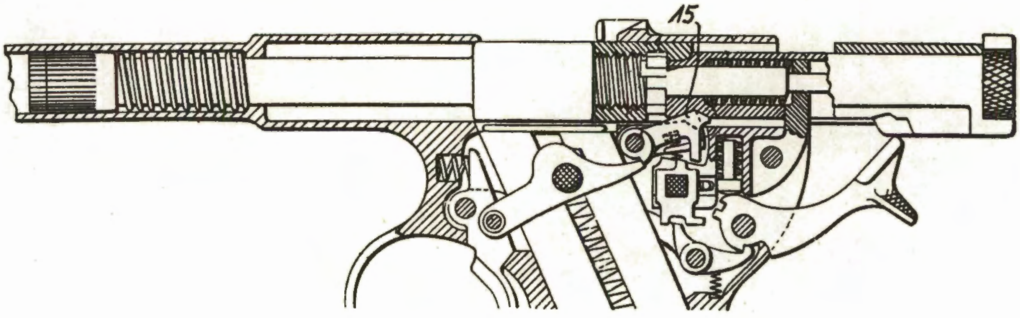


FIGURE 7–7. Section views of the Frommer 1910 pistol. Note the sketch of the bolthead. (*Lockhoven*)

FIGURE 7–8. The 7.65mm Browning caliber Frommer Model 1910 pistol, serial number 7179. (*Visser*)

recoiling barrels and bolts, but by placing them in the same tunnel, one behind the other, Frommer was able to design a more compact handgun. Unfortunately, this spring arrangement complicated the assembly and disassembly of his pistol.

Only the 7.65mm caliber Frommer Stop pistols were used by the military. In the post-World War I period, these pistols were called the 19 Minta Pisztoly (Model 19 pistol) by the Hungarian armed forces. Production of the 9mm Browning caliber version began in 1919, at which time these guns were sold commercially. No 9mm Frommer Stop pistols have been encountered with government markings. Production continued until the early 1930s; the quantities produced are not known, but serial numbers as high as 329,000 have been reported,

Model 29 Pistol

In 1929, the Hungarian army introduced the blowback 9mm Browning caliber Pisztoly 29 Minta (Model 29 pistol) which had a modified Browning locking system. Elements of this design were patented in Rudolf Frommer's name. It was manufactured by the Fémáru Fegyver és Gépgyár R.T. (Metalwares, Small Arms and Machine Works, Ltd.; Metallwaren, Waffen und Maschinenfarbik, Budapest), the post-1919 name for the Fegyver és Gépgyár Részvéntytarsaság. Fifty thousand of these Model 29 pistols were fabricated between 1929 and 1935. In 1936, steps were taken to simplify the Model 29 and make it easier to manufacture. Production of this modified pistol, which was designated the 37M, began in 1937 and continued until 1942; serial numbers for the 37M begin at 50,000. Early in 1941, the German Heereswaffenamt ordered 50,000 7.65mm caliber Model 1937 pistols for the Luftwaffe. Earliest deliveries of 7.65mm 37M pistols appear to have been 9mm models rebarreled to 7.65mm Brownings; examples of this type are reported to have serial numbers in the 200,000 range. The German code letters for the Fegyvergyar was *jvh.*

By mid-1941, a mechanical safety had been added to the 37M at the insistence of the German ordnance authorities. The slide markings were changed to *Pistole M.37 Kal. 7–65mm,* and Waffenamt acceptance stamps were placed on the pistols accepted by the Germans. A total of about 90,000 37Ms were built for the Germans, and the total production of the Model 29 and 37M was about 300,000.

Before turning to the Mannlicher pistols, one other pre-1914 Roth pistol should be mentioned briefly. The Roth-Sauer, covered by several Krnka and Roth patents, was another attempt to create a turning bolt self-loader. Built by J. P. Sauer und Sohn of Suhl, Germany, this pistol fired the same 7.65mm cartridge used in the early Roth-Steyr pistols, only it was loaded with a lighter powder charge. An interesting pistol because of its external appearance, only a few were manufactured, and they were not powerful enough for military use.

FERDINAND RITTER VON MANNLICHER

The earliest born of the Austro-Hungarian self-loading handgun designers, von Mannlicher was by far the most prolific. Born at Most, Bohemia on 30 January 1848, Mannlicher pur-

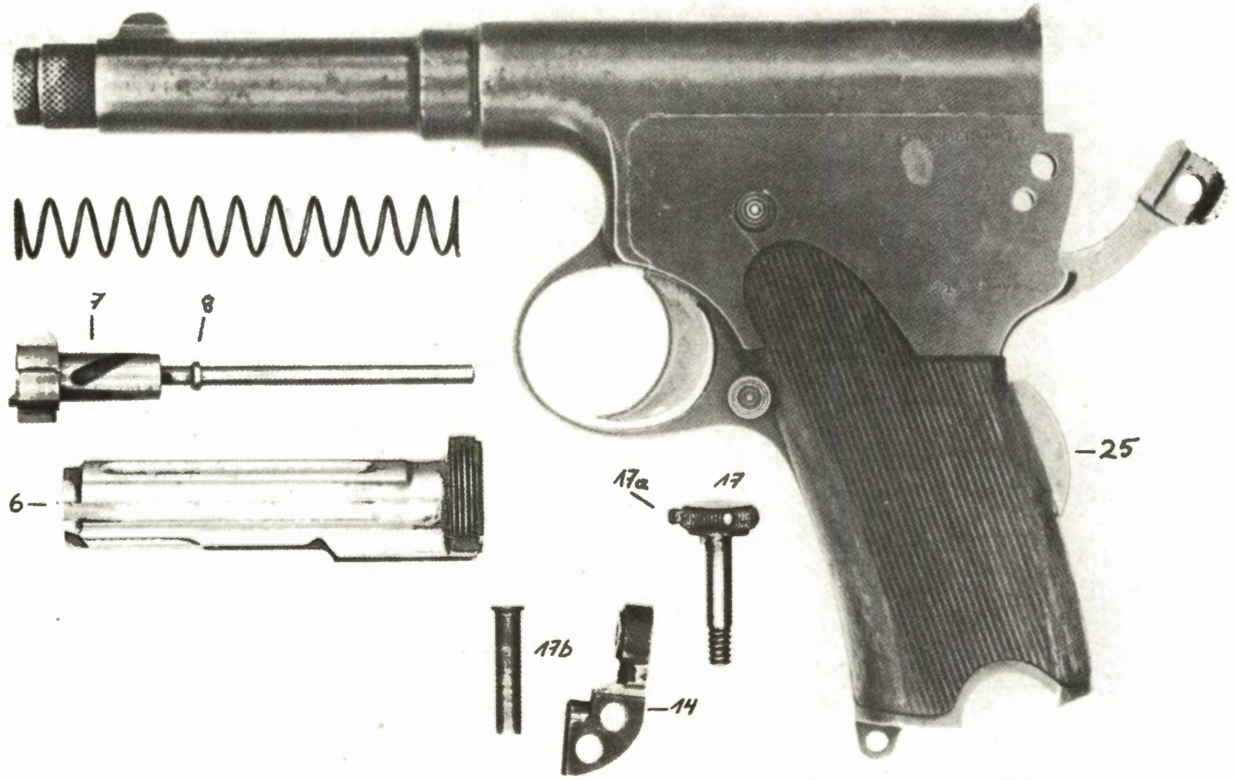


FIGURE 7–9. Field-stripped view of the 7.65mm Frommer Model 1910 pistol, serial number 9149. (*Lockhoven*)

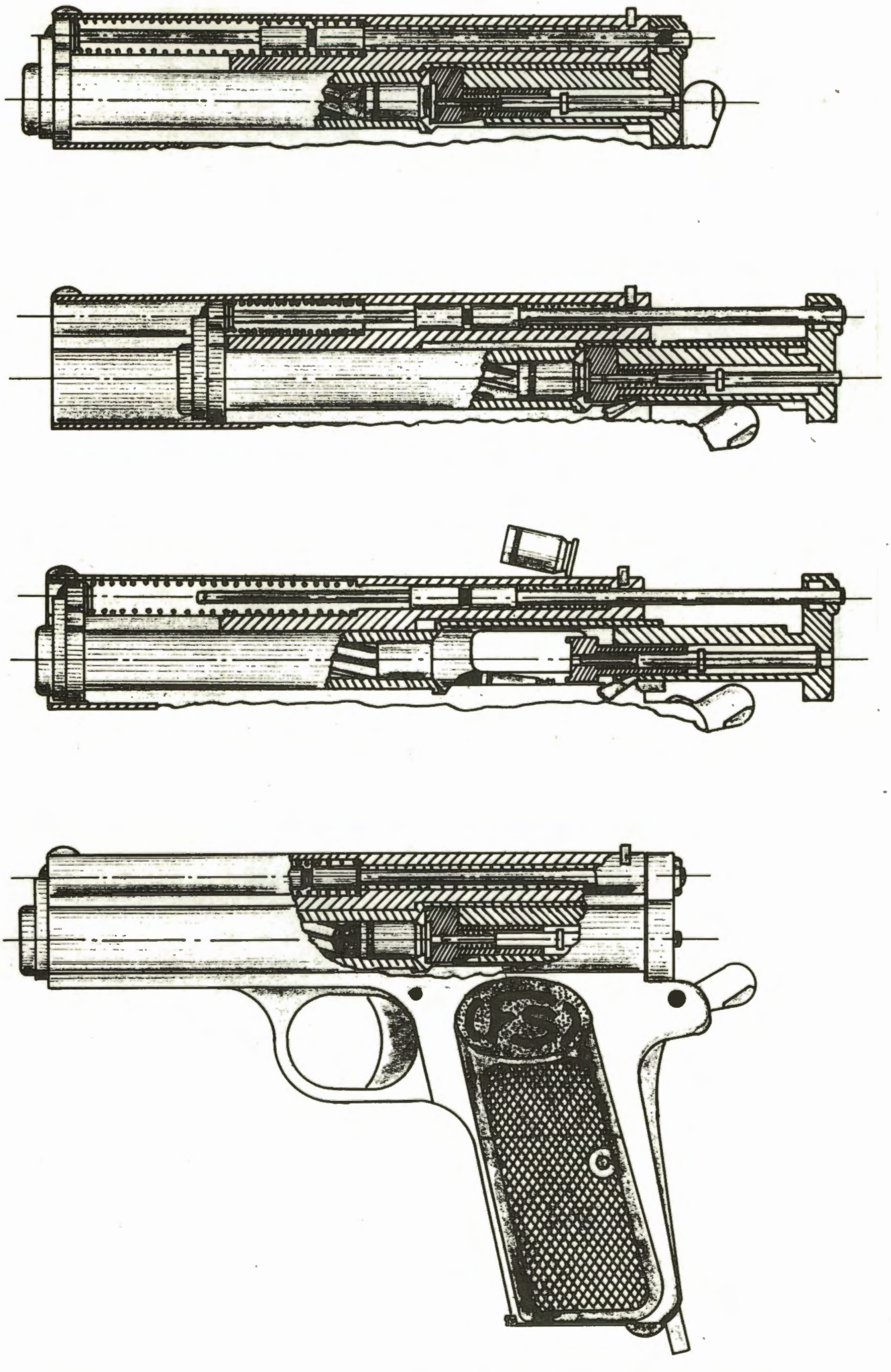


FIGURE 7–10. The firing cycle of the 1912 Frommer Stop pistol. Note that the forward spring controls the barrel recoil, while the rear spring controls the recoil of the bolt. (*Simmons*)

FIGURE 7–11. The 7.65mm Browning caliber Frommer Stop pistol, serial number 71255. This pistol had a 96mm barrel, was 165mm overall, and weighed 608 grams. It had a 7-shot magazine and 4 right rifling. (*Krcma*)

FIGURE 7–12. A 9mm (.380) Browning caliber Frommer Stop pistol, serial number 329490, with wooden grips. (*FN*)

sued a technical education at the Engineering College in Vienna. Upon graduating he worked as an engineer designing equipment for the Austrian railway corporation. He was inspired to design small arms by his visit to the American Centennial Exhibition held in Philadelphia in 1876. About 1878 Mannlicher began experimenting with ideas for repeating rifles, and his first shoulder weapons were built in 1880. After several designs for breech-loaders, the Austrian government adopted his straight-pull, bolt-action rifle in 1886 as the *Österreichisches Repetier-Gewehr M. 86*. Mannlicher, who had left the railroad world behind, devoted himself full time to the design of firearms, including self-loading guns (for example, Modell 1885, 1891, and two 1893 rifles). By 1893 he had also created a self-loading pistol, unique because of its blow-forward operating mechanism (chapter 3).

Modell 1894

The first Modell 1894 pistol fired a rimmed 8mm cartridge, and was manufactured by the Fabrique d'Armes Neuhausen (the Schweizerische Industrie Gesellschaft am Rheinfall). This 8mm cartridge is believed to have been the same one used in the 1894 Salvator-Dormus pistol. When production of the 1894 Mannlicher was transferred to the OWG, Steyr, the caliber was changed to the 7.6mm Mannlicher cartridge. Mannlicher's 1894 pistol was referred to as a *Halbautomatische Repetier-Pistole* or semi-automatic in the sense that the gun was reloaded by recoil operation, but the hammer was not recocked (see chapter 3). The hammer had to be manually cocked like a revolver, double-action or single-action, after each shot. As in most revolvers, the firing pin was mounted on the hammer in the Modell 1894. This handgun was still a transitional design: halfway between the mechanical repeaters and the self-loaders. As manufactured at the OWG, Steyr, the Modell 1894s bear Mannlicher's name and many components carry the serial number. Less than 100 Modell 1894 pistols were built by both the Fabrique d'Armes Neuhausen and the OWG, Steyr.

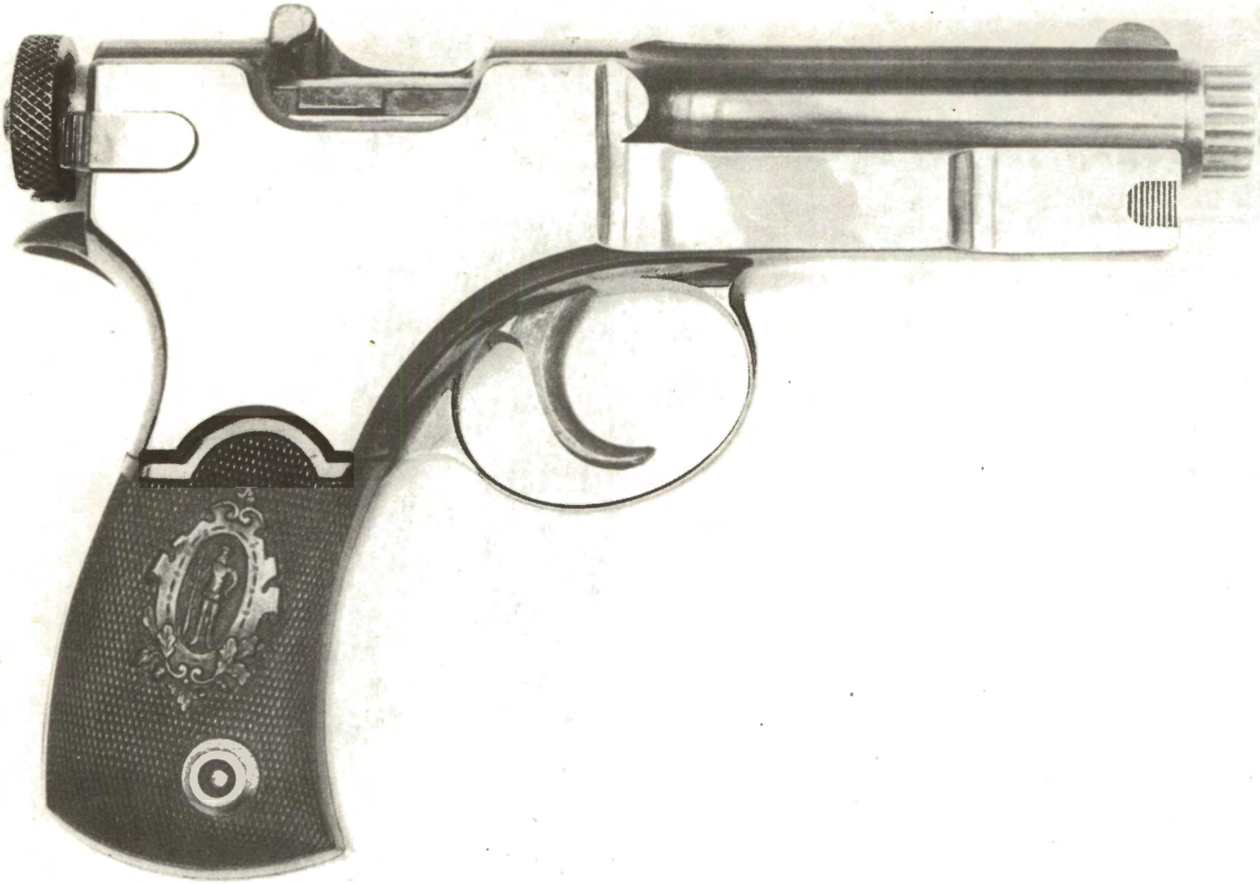
In the Modell 1894, the barrel was enclosed in a special cylindrical housing (outer barrel) and was free to move forward with the fired projectile. As the barrel moved forward it extracted and ejected the fired cartridge. The barrel would lock open if pressure was maintained on the trigger. As soon as the trigger was released, the barrel catch was released and the barrel slammed back under spring pressure. As the barrel moved over the top of the magazine, it removed the top cartridge from the feed device. The pistol was then ready to fire again. This pistol had no mechanical safety devices, because Mannlicher believed that none were needed as long as the gun was not cocked.

Modell 1896 (I)

Several features, including difficulty in reloading, made the Modell 1894 unsuited for military purposes. As a consequence, Mannlicher worked up a better design: this time a

FIGURE 7–13. The 9mm Browning caliber Hungarian Pisztoly 29M, serial number 26656. This pistol had a 99.5mm barrel, was 172mm overall, and weighed about 750 grams. It had a 7-shot magazine, with 4 right rifling. (*Krcma*)

FIGURE 7–14. ***Top,*** **the 9mm Browning caliber Hungarian 37M and** ***bottom,*** **the 7.65mm version made during World War II for the Luftwaffe. Note the safety catch on the German model. (*****Krcma*****)**



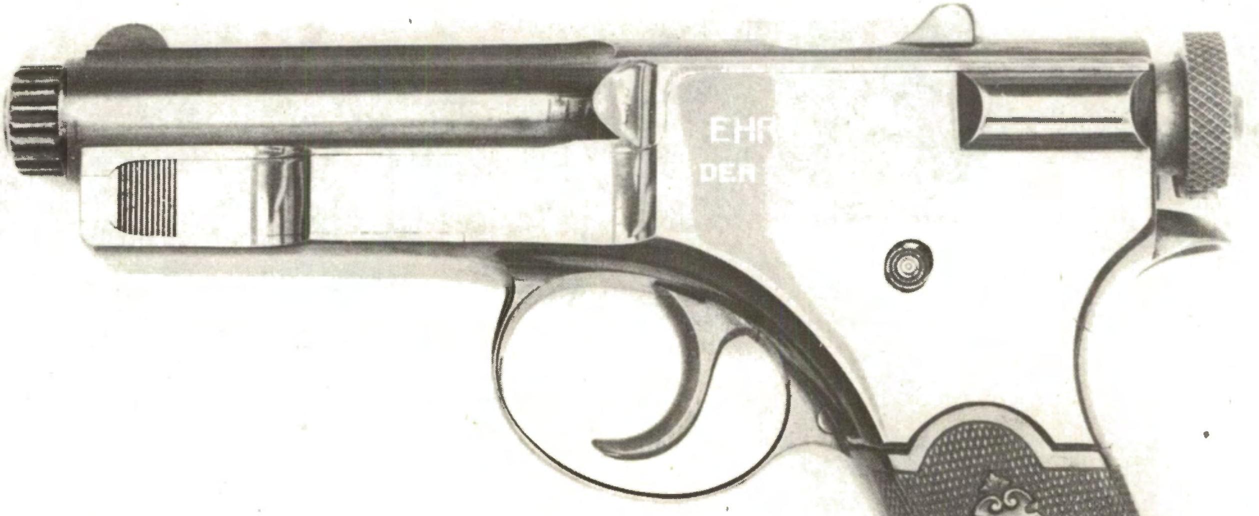


FIGURE 7–15. The 7.65mm Roth-Sauer pistol, serial number B597. This pistol had a 97mm barrel, was 168.4mm overall, and weighed 652 grams. The feed device held 7 shots, and was charged with a stripper clip. (*Visser*)

FIGURE 7–16. Ferdinand Ritter von Mannlicher (1848–1904). (*Heeresgeschichtlichen Museums*)

blow-back type. This handgun, the Modell 1896 (I), had a fixed barrel with a recoiling bolt. Its box-type, nondetachable magazine, mounted in front of the trigger guard, was charger loaded with 6 cartridges. Again the lock mechanism did not cock during the recoil stroke; it was cocked by a lever mounted on the right side of the frame. This cocking lever was connected to the concealed hammer inside the weapon. The Modell 1896 (I) was chambered for the rimmed 7.60mm Mannlicher cartridge. Only a limited number of these pistols were fabricated, largely because of the limited power of the cartridge. The 7 gram bullet had a muzzle velocity of 243 meters per second, while the C96 Mauser cartridge by comparison had a 5.1 gram bullet that had an initial velicity of 440 meters per second. Considering the fact that high projectile velocity was a key selling point in self-loading pistols at the turn of the century, the Mannlicher Modell 1896 (I) never had a chance to gain popularity.

Modell 1896 (II)

Introduced in 1896, this locked breech pistol looked similar to the blowback Modell 1896 (I). Since this pistol was not placed on the market until 1903, it often is called the Modell 1903. More properly it should be referred to as the Modell 1896 (II) or the Modell 1896/1903. The OWG, Steyr submitted it to Swiss military authorities in 1897 for military trial. This Modell 1896 (II) fired a bottle-necked cartridge similar in dimensions to the 7.63mm Mauser, but the Mannlicher version was loaded to produce a lower velocity: 381 meters per second versus 440 meters per second. Mannlicher might have taken this step because he did not think that his pistol was strong enough to take the recoil forces of the full-power Mauser cartridge. By requiring a less powerful cartridge, he doomed his design to commercial failure.

Mannlicher's 1896 (II) pistol had a barrel that was screwed into a barrel extension (upper receiver) within which the bolt reciprocated. When the barrel and the bolt began to travel to the rear, they were locked together. Attached to the rear of the barrel extension was a steel strut, which was forced up behind the bolt, locking it in place. Upon discharge of the cartridge, the barrel and bolt recoiled about 5mm before the bolt-locking strut was withdrawn from its supporting ramp in the frame. As the bolt rode over the unsupported strut, the bolt could continue its recoil to the rear freed from the barrel. This second version of the 1896 pistol also had an external cocking lever, and there was a safety lever that acted to block the movement of the hammer.

As with Mannlicher's other pistols, this 1896 (II) was a failure in the marketplace. Only 3,000 or so were manufactured before the beginning of the First World War forced termination of its production.

MODELL 1900/1901

Mannlicher's Modell 1900/1901 pistol was the most successful of his handgun designs. As first demonstrated, the Model 1900 fired the 8mm rimmed cartridge described for the Modell 1894 pistol. Because of its limited power, Mannlicher switched from the 8mm cartridge to a 7.63 × 21mm round that fired a 5.5 gram bullet at 305 meters per second. This rimless, straight-sided cartridge became widely known as the 7.63mm Mannlicher. The Modell 1900/1901, which fired the 7.63mm Mannlicher, was a blowback design. This pistol was a much better design from a military standpoint than his earlier attempts. Tested in 1904 and 1905 by the Austro-Hungarian military, the Modell 1901 was rejected. Many officers in the Austro-Hungarian armed forces privately acquired the Modell 1901 (that is, the 7.63mm version), and carried them as their personal sidearms. With the exception of the cavalry, which carried the Roth-Steyr, the Austro-Hungarian forces continued to use the Modell 1898 Rast-Gasser revolvers until the Frommer Stop was adopted in 1907, and the Steyr Hahn was selected in 1911.

Robertson Honey, of New York City, presented a Modell 1901 for testing by a Board of Ordnance Officers in February 1902. The report of the board (Lieutenant Colonel John Pitman and Captain John T. Thompson) described the Modell 1901 Mannlicher.

> *Description of Action*
> The pistol is a semi-automatic fire arm which is constructed with a moveable barrel, the breech block being rigidly bolted to it at the instant of firing. The recoil produced by the discharge imparts

FIGURE 7–17. The 7.60mm Mannlicher Modell 1894 blow-forward, self-loading pistol. (*J. E. Smith*)

...atic Magazine Pistol. Model 1894.

Barrel forward.

...ize)

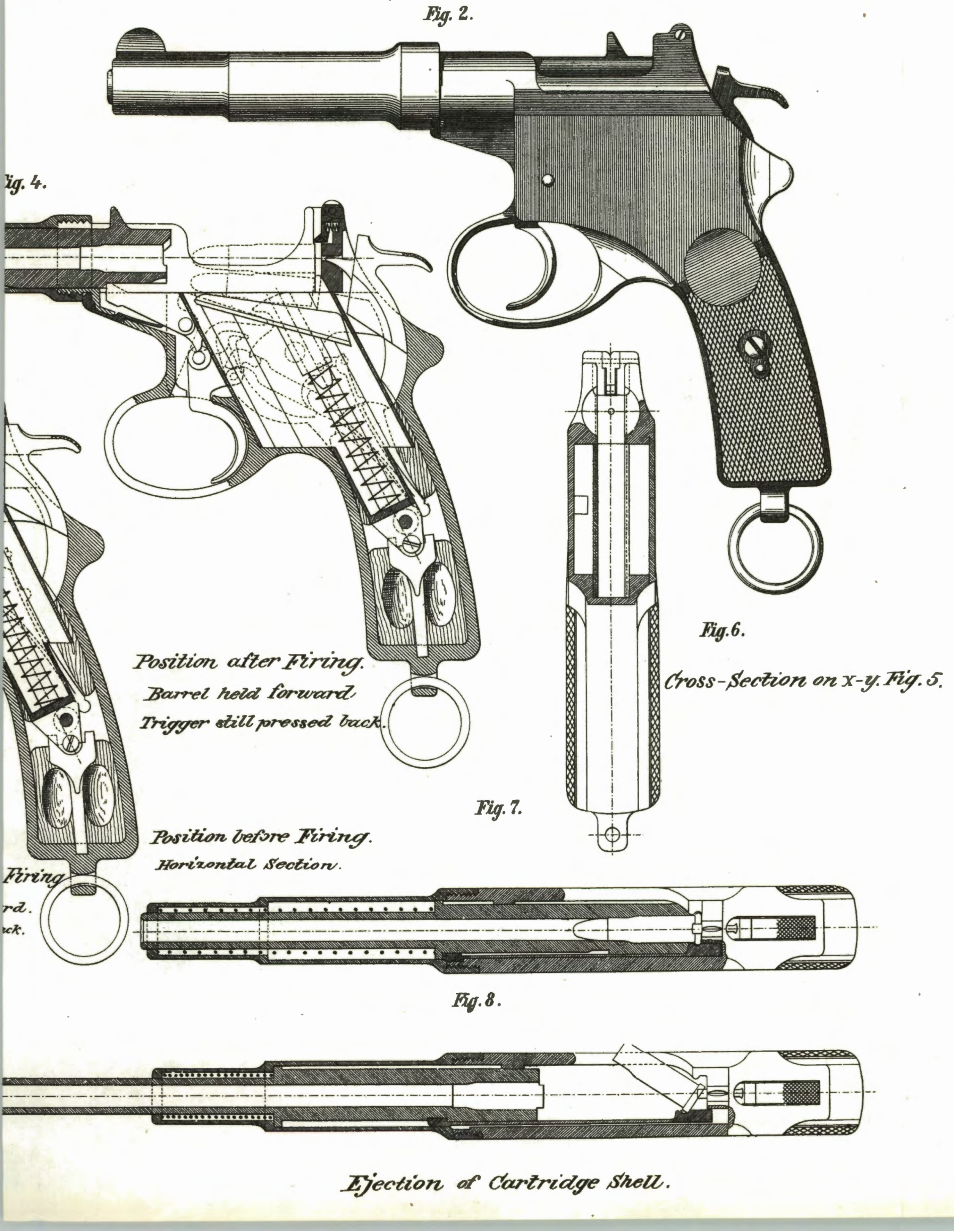


FIGURE 7–18. Mannlicher's 8mm Modell 1894 self-loading pistol, serial number 16. This pistol had a 185mm barrel and was 222mm overall. (*Visser*)

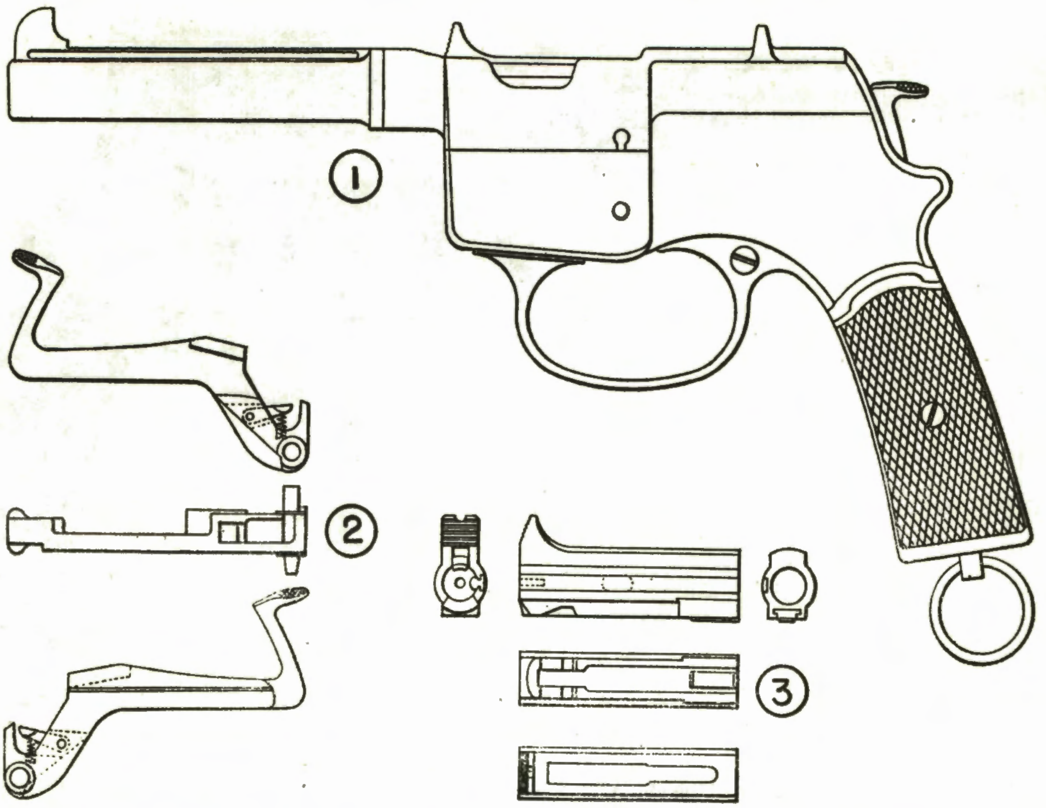


FIGURE 7–19. The 7.60mm Mannlicher Modell 1896 (I) self-loading pistol. *1.* Left side view with action closed. *2.* Three views of the hammer cocking lever. *3.* Five views of the breech block (bolt). (*Von Kromar/Smith*)

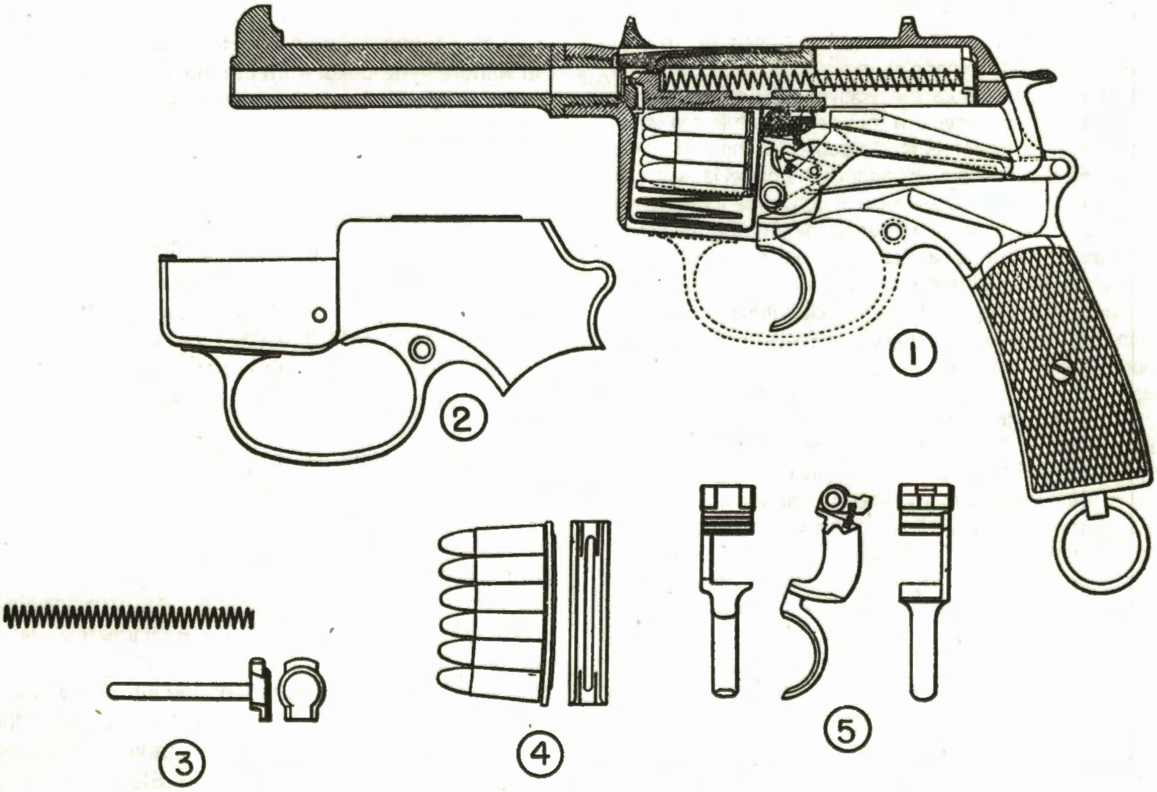


FIGURE 7–20. Section view of the Modell 1896 (I) Mannlicher pistol. *1.* Note that the hammer is cocked in this drawing. *2.* Side plate removed to expose interior of pistol. *3.* Recoil spring and spring guide. *4.* Loaded cartridge charger clip. *5.* Views of the trigger. (*Von Kromar/Smith*)

FIGURE 7–21. This unnumbered prototype of the Mannlicher Modell 1896 (II) was tested in the 1897 Swiss pistol trials. (*Waffenfabrik Bern*)

> a rectilinear retrograde movement to the barrel, the breech block and the receiver in which the breech block is seated; when these pieces have receded together a short distance (4m/m) on a line parallel to the axis of the bore, the receiver with the barrel which is screwed into it, strikes against a shoulder of the frame in which it is guided, and its motion is thus stopped. At the same time the bolt forcing the breech block against the barrel is automatically uncoupled and the breech block continues its rearward course alone, laying bare the upper opening of the magazine so that the empty cartridge case is thrown out, the breech block spring compressed and the hammer cocked.
>
> Immediately afterwards the breech block is thrown forward by the action of its compressed spring and presses into the cartridge chamber the upper cartridge which has meanwhile risen from the magazine. At the conclusion of this movement of the breech block, the barrel with receiver, having also become free, is pushed into firing position, and the coupling between the breech block and the barrel is again automatically restored. . . .
>
> The magazine is charged from the top with the breech block back during the operation. A clip holding six cartridges is seated into the receiver and the thumb strips the cartridges into the magazine. The clip is of special and peculiar construction (system Mannlicher-Pieper). The cartridges can be stripped off only after the clip has been seated.[1]

During their tests of the Mannlicher Modell 1901 pistol Pitman and Thompson had only one jam in thirty shots fired. The velocity of the projectile at 16.2 meters was 365 meters per second. At 22.9 meters the bullet penetrated 259mm of pine board. Testing was complicated by two factors. First, they had a very small supply of ammunition. Second, when they disassembled the pistol to examine its construction, the officers and Mannlicher representatives were unable to get the gun back together again. Mr. Honey and his assistant decided to withdraw the pistol from the trial. In August, 1903, Colonel Frank Phipps, commanding officer at Springfield Armory, suggested that fifty Modell 1901 Mannlicher pistols be acquired for testing. This recommendation was not approved by the Ordnance Office in Washington. Mannlicher's pistol was not tested further in the United States.

It is estimated that about 12,000 of the 1901 series and 300 of the 1900 series pistols were manufacutred. There were a number of minor variations in the external appearance of the Modell 1901s that appeared during the production of these pistols. Early models (below serial number 200) had a different type of safety mechanism: a large thumb lever locked the hammer. Pistols made in 1900 and 1901 had a rear sight mounted on a post in front of the ejection port. Sometime in 1902, this post was removed and the sight became a notch on the rear end of the slide (breech block). This change extended the sight radius and lowered the line of sight, permitting the front sight to be lowered as well. Barrels vary in length with 140mm and 160mm barrels being the most common. Markings on these pistols also vary. Original Modell 1900 and the first 200 or 300 Modell 1901 pistols were marked "Patent Mannlicher" on the left side of the slide arm. Later in 1901, "Waffenfabrik Steyr" was added to the left side of the lock plate. In 1902, the markings became "Patent Mannlicher Md 1902 Waffenfabrik Steyr" on the lock cover plate. Subsequently the date was changed with each passing year. The last to be manufactured was the "Md 1905."

Despite sales of small quantities to the Argentine govern-

FIGURE 7–22. Production version of 7.63mm Mannlicher 1896 (II) pistol, which was first commercially marketed in 1903. This pistol, serial number 348, had a 119.5mm barrel, was 265mm overall, and weighed 1,006 grams. The feed device held 7 shots, 4 right rifling. (*Krcma*)

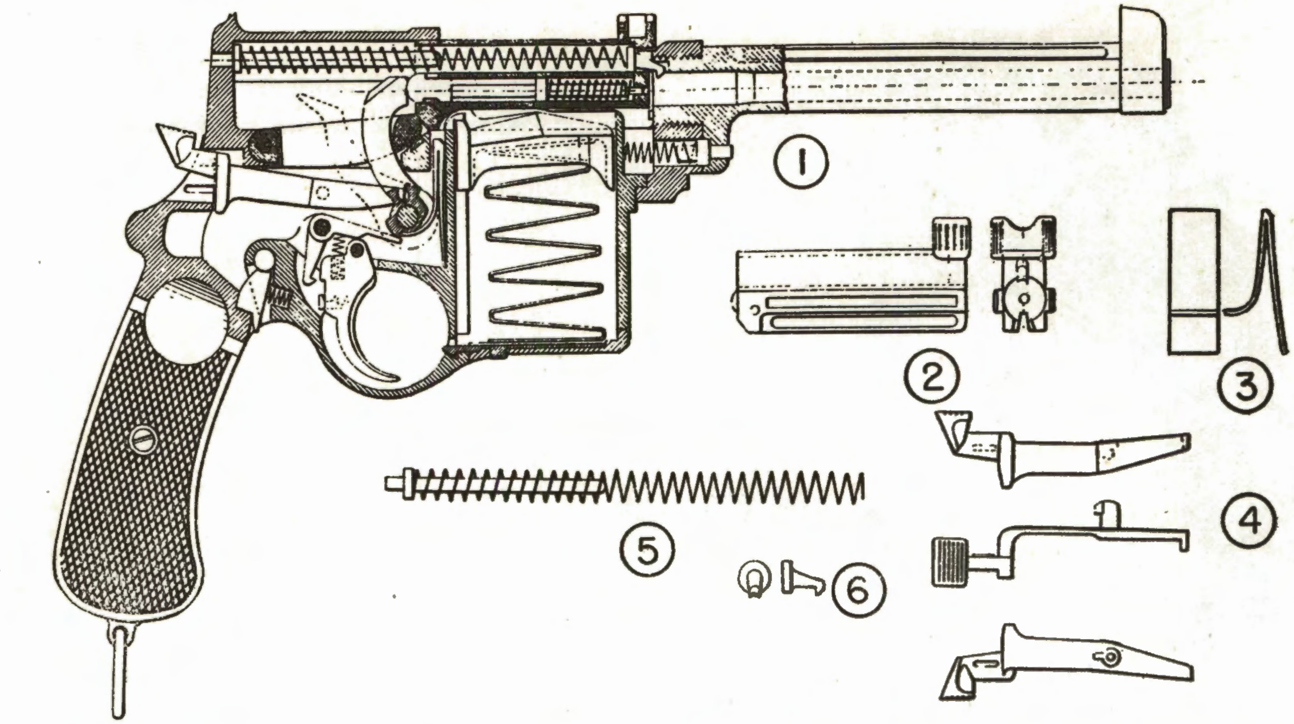


FIGURE 7–23. Mannlicher's Modell 1896 (II) self-loading pistol. *1.* Section view of the right side of the pistol. Note that the hammer is resting against the firing pin. *2.* Views of the breech block (bolt). *3.* Views of the mainspring. *4.* Views of the safety lever. *5.* View of the recoil spring with guide. *6.* View of the extractor. (*Von Kromar/Smith*)

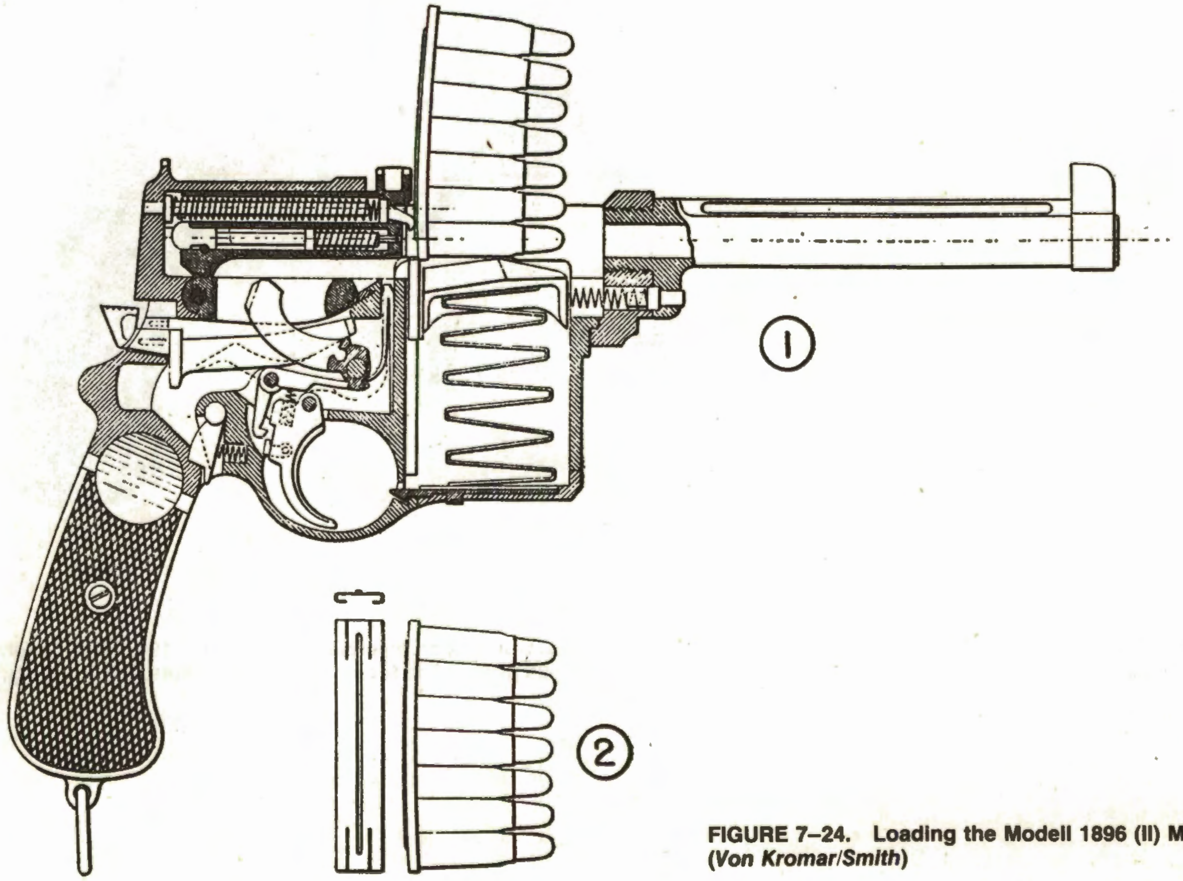


FIGURE 7–24. Loading the Modell 1896 (II) Mannlicher pistol. (*Von Kromar/Smith*)

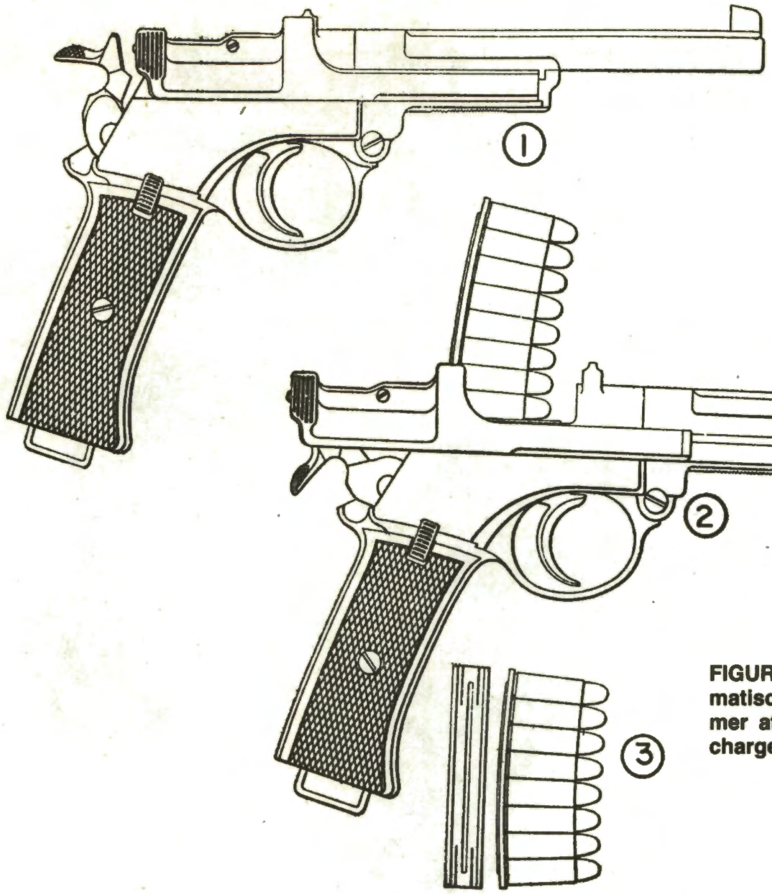


FIGURE 7–25. The Modell 1900/1901 Mannlicher pistol (Automatische Repetier-Pistole M. 1900) *1.* Right side view with hammer at half cock. *2.* Right side view with bolt retracted and charger clip in place. *3.* Loaded charger clip. (*Von Kromar/Smith*)

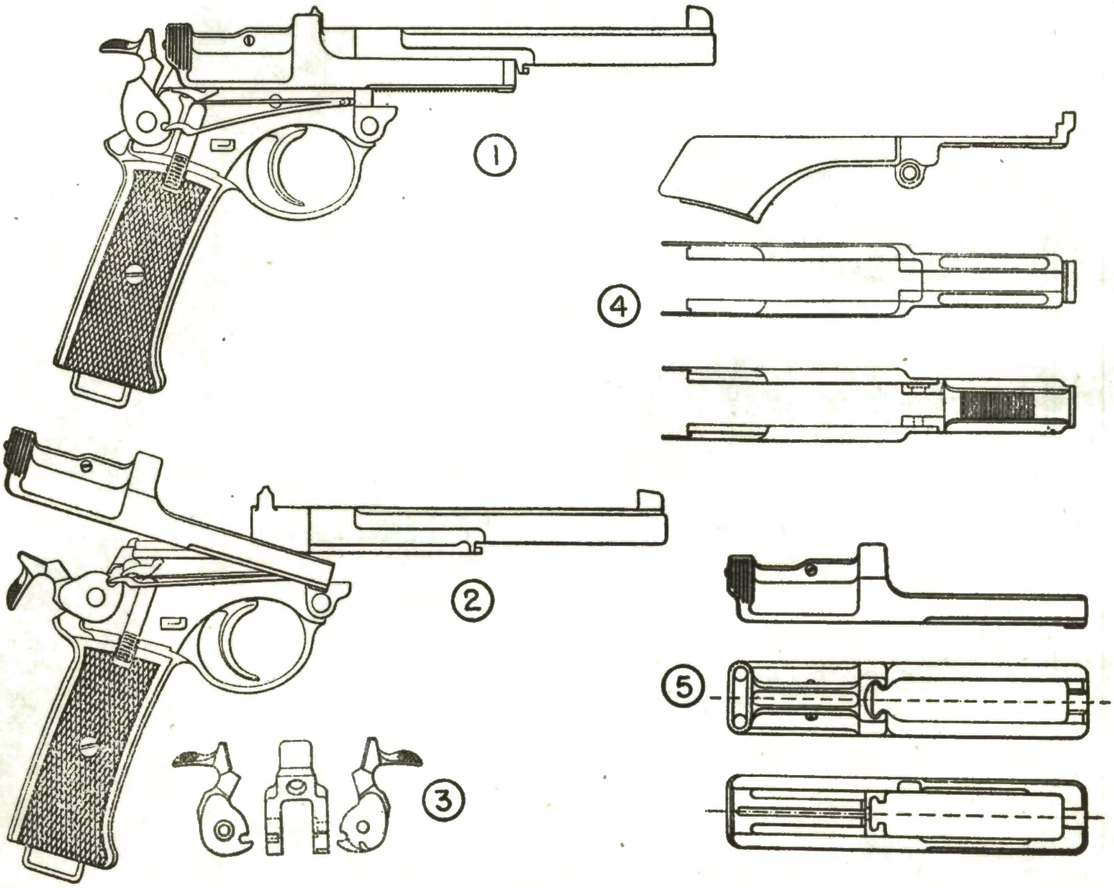


FIGURE 7–26. Disassembly of the Mannlicher Modell 1900/1901 pistol. *1.* Right side view with lock cover plate removed. *2.* The slide is removed by pulling it back, lifting, and then pushing it forward over the barrel. *3.* Views of the hammer. *4.* Views of the one-piece cover plate that protects both sides of the lock mechanism. *5.* Views of the breech block (slide). This is one of the simplest self-loading pistols ever manufactured. (*Von Kromar/Smith*)

FIGURE 7–27. ***Bottom,*** **the Mannlicher Modell 1900 pistol, serial number 142.** ***Top,*** **a Modell 1901 Mannlicher, serial number 3305, manufactured in 1905. Note the lower front and rear sights on the 1905-made pistol. (*Krcma*)**

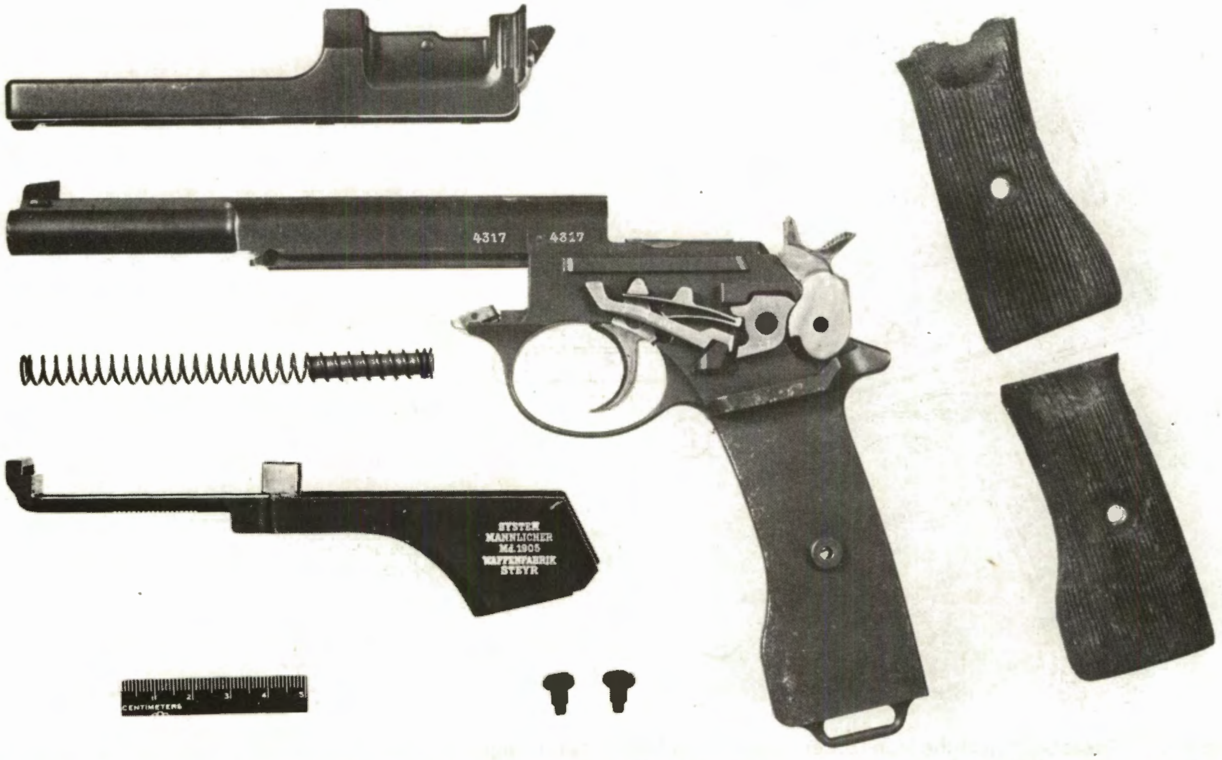


FIGURE 7–28. Disassembled view of the Modell 1901 Mannlicher pistol. Note the extremely simple mechanism. This pistol, serial number 4317, had a 160mm barrel, was 238mm overall, and weighed about 900 grams. It had an 8-shot feed device and 4 right rifling. (*Krcma*)

FIGURE 7–29. Close-up view of the Model 1901 Mannlicher pistol lock mechanism. (*Krcma*)

ment, the Model 1901 Mannlicher pistol was not much of a success commercially or militarily. As much as he labored, Ferdinand Ritter von Mannlicher could not find the same acceptance for his pistols as he had for his shoulder weapons.

STEYR (STEYR HAHN) MILITARY PISTOL

This 9mm, recoil-operated, rotating barrel pistol was patented in the name of the Österreichische Waffenfabrik Gesellschaft at Steyr (British patent 29279, 1911 and 8220, 1912). Steyr Hahn (Steyr Hammer) was used to distinguish it from the Steyr-Roth pistol; nevertheless, Steyr Hahn is not an official designation. The design genealogy of this weapon is uncertain. It is probable that Karel Krnka had a hand in the design as elements of the Roth-Steyr and Colt-Browning Model 1900 have been incorporated into it. The Steyr Hahn's slide enveloped the barrel, and these two components were locked together by two lugs on the top of the barrel. The barrel was held in the frame by a helical lug on the underside of the barrel that engaged a corresponding groove in the frame. Upon firing, the slide and the barrel moved to the rear together for about 8mm during which time the lower barrel lug moving in the frame groove caused the barrel to rotate. This rotation unlocked the barrel from the slide, and as the two components disengaged, a fourth lug on the bottom of the barrel hit a lip on the frame bringing the barrel to a stop. As in many other external hammer self-loading pistols, the recoiling slide cocked the hammer. The Steyr Hahn was an eclectic design that embodied elements from many different pistols.

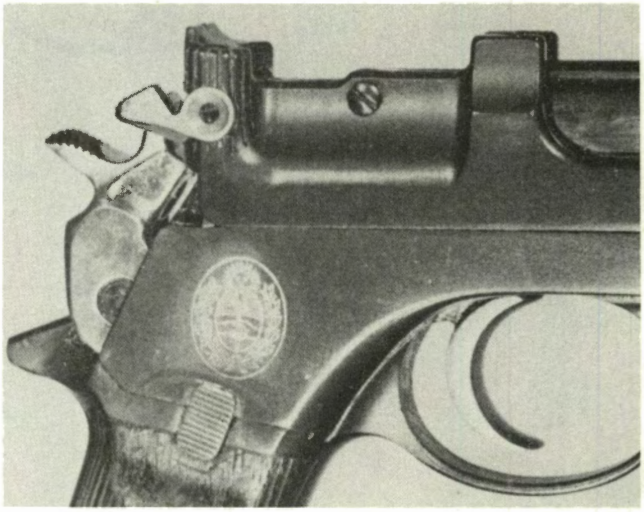


FIGURE 7–30. Argentine-marked Model 1901 Mannlicher pistol. (*Nonte*)

FIGURE 7–31. A Modell 1912 Steyr Hahn pistol made in 1914 with the serial number 9592f. After reaching 9,999 in each letter series the serialing started anew with one and the next letter; 9,999f would be followed by 1g. This pistol had a 128.5mm barrel, was 212mm overall, and weighed 963 grams. The 8-shot feed device was clip charged. Rifling was 4 right. (*Krcma*)

FIGURE 7–32. A commercial Model 1911 Steyr Hahn pistol sold to the government of Chile. The pistol was marked with the Chilean crest, serial number (2503B), Steyr 1912, and MOD.1911. (*Visser*)

FIGURE 7–33. Chilean army markings on the Steyr Model 1911 pistol.

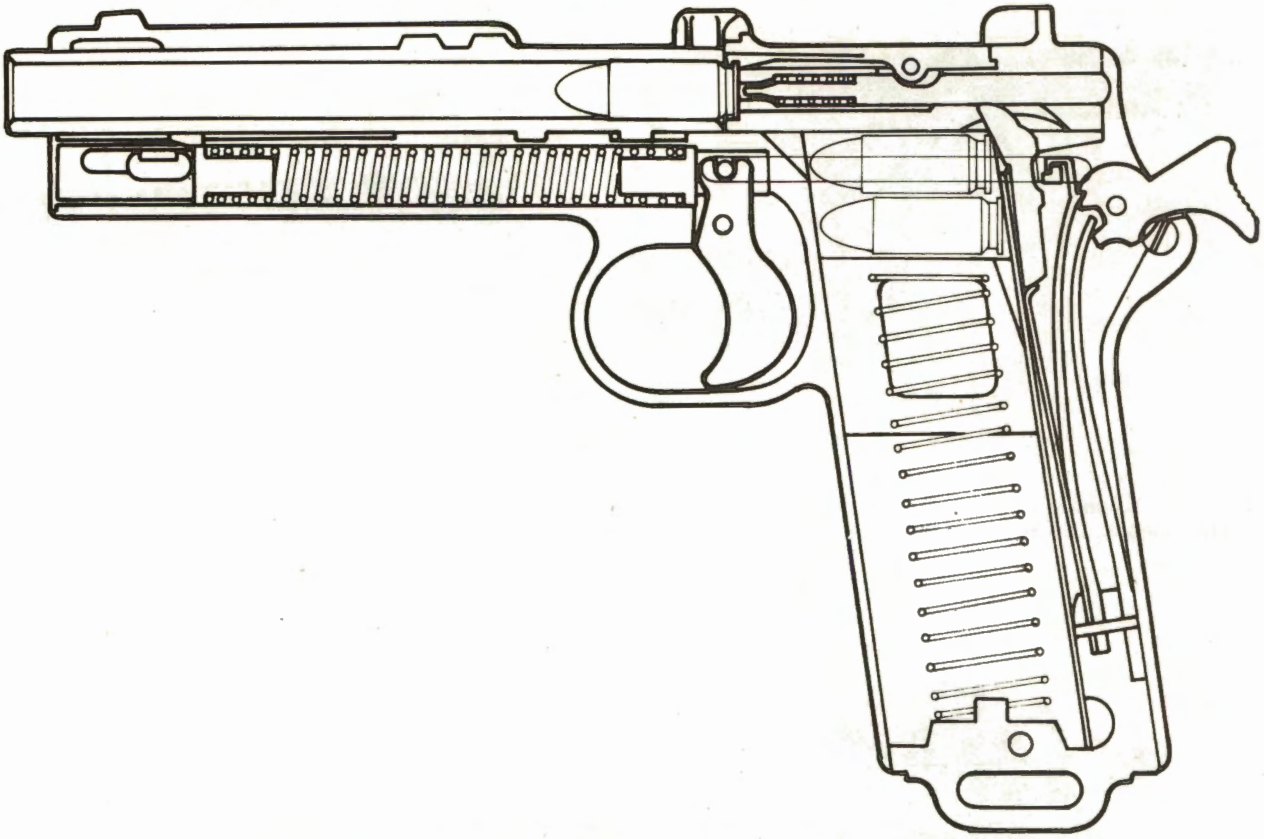


FIGURE 7–34. Section view of the Model 1912 Steyr Hahn pistol. (*Jimbo*)

The locking mechanism of the Steyr Hahn pistol was very strong, and its strength permitted the designers to use a powerful cartridge. Most military handgun authorities have attributed the popularity and success of the 1912 Selbstlade Pistole-Steyr to the combination of a strong breech mechanism and a powerful cartridge. This 9 × 22.7mm cartridge had a 7.5g projectile that had an initial velocity of 335 meters per second. This was lower than that of the 9 × 19mm Parabellum cartridge, but it still was a powerful round by European standards. Officers of the Kaiserliche und Königliche Armee began to receive this handgun in 1912. Steyr also sold pistols to Romania in 1913 and to Chile in 1913 and 1914. It is estimated that a total of 250,000 pistols were built before production was terminated by the ending of the 1914 to 1918 war. Commercial models were marked "Osterreichische Waffenfabrik Steyr M1911 9m/m" on the slide and they also carried Austrian proof marks. Military models were marked simply "Steyr." The Romanian models had the national crown and "Mod 1912." Chilean Model 1912s were marked "Ejercito de Chile." Occasionally, one will encounter Model 1912 Steyr Hahn pistols marked "P–08" on the rear end of the slide on the left. These were pistols captured by the Germans and rebarreled to 9mm Parabellum. They were generally issued to troops enforcing the occupation of Austria after the takeover in 1938.

Clearly, the golden age of handgun design in Austria was between the years 1895 and 1914. With the death of the Empire the arms designing talent was spread throughout the former parts of the Empire and throughout Europe. None of the four figures mentioned in this chapter lived to see the Second World War—Mannlicher died in 1904, Roth in 1909, Krnka in 1926, and Frommer in 1936.

NOTES

The basic source of information about Mannlicher's handguns is Konrad von Kromar. *Repetier- und Automatische Handfeuerwaffen der Systeme Ferdinand Ritter von Mannlicher.* Vienna, 1900.

The illustrations and much of the text was used by W. H. B. Smith to prepare his book, *Mannlicher Rifles and Pistols: Complete information on 40 sporting and military weapons.* Harrisburg: The Military Service Publishing Company, 1947.

Other helpful works include: J. Howard Mathews. *Firearms Identification,* Vol. I. Springfield, IL: Charles C. Thomas, Publisher, 1962. pp. 199–202; 226–232; 261–263; and 282–284. Ian V. Hogg and John Weeks. *Pistols of the World.* London et al.: Arms and Armour Press, 1978. pp. 103–105; 151–153; and 229–234.

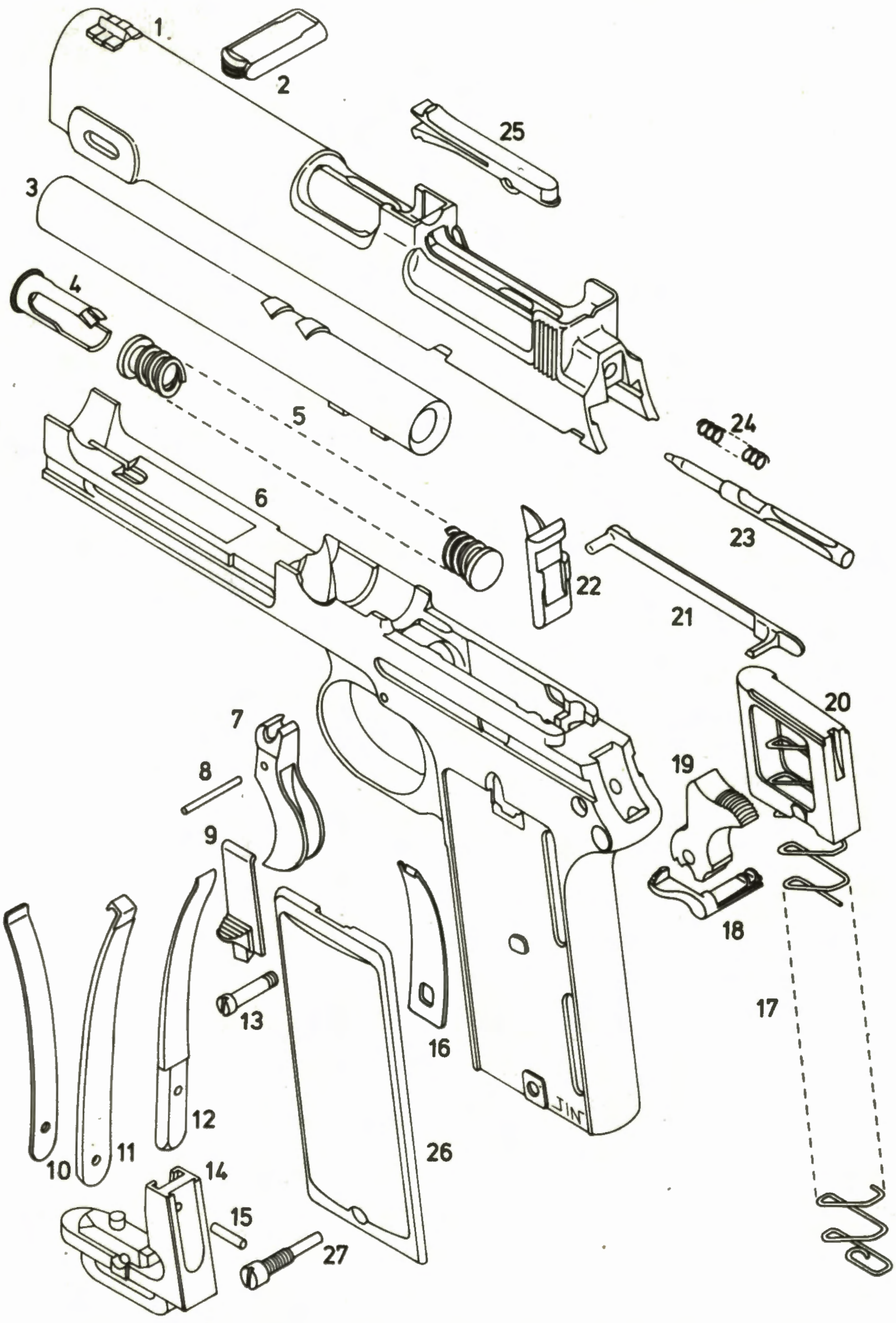


FIGURE 7–35. Disassembled view of the Modell 1912 Steyr Hahn pistol. (*Jimbo*)

1. Slide
2. Slide retention wedge
3. Barrel
4. Recoil spring retainer
5. Recoil spring
6. Frame
7. Trigger
8. Trigger pin
9. Cartridge release
10. Disconnector spring
11. Sear and sear spring
12. Hammer spring
13. Hammer screw
14. Magazine floor plate
15. Spring retainer spring
16. Cartridge release spring
17. Magazine spring
18. Safety
19. Hammer
20. Magazine follower
21. Trigger bar
22. Ejector and disconnector
23. Firing pin
24. Firing pin spring
25. Extractor
26. Grip plate
27. Grip plate screw

8 GERMAN HANDGUNS 1894 to 1945

Few aspects of military technology have received as much attention as the handguns developed in Germany since the 1890s. Since there are many books on this topic, this chapter presents only a basic outline of the history of Bergmann, Mauser, and Walther military pistols.* Special attention is given to those adopted or used in large numbers by the armed forces of Europe.

THEODOR BERGMANN

Theodor Bergmann was an industrialist who believed that military small arms was one of many potentially profitable product lines. Bergmann was born on 21 May 1850 into a family of brewmasters and innkeepers in the town of Spessartdorf. As a young man he worked for a local stove manufacturer, and as a result became interested in the metal working trade. In 1879, he took his wife and family to an industrial town called Gaggenau where be became a partner in an ironworks. Gaggenau was one of several important German communities that supported industrial concerns involved in the conversion of iron to a variety of utilitarian products. Gaggenau (located on the west side of the Schwarzwald [Black Forest], northeast of Baden-Baden in Baden Würtemberg), Oberndorf an Neckar, Suhl, and Zella-Mehlis were four such centers that became focal points for the German arms industry.

With the passage of time, Bergmann's importance to the firm grew, and he took full control of the operation of the iron works when the senior partner retired. By the last years of the nineteenth century, the firm—Bergmanns Industriewerke—was producing stoves, household implements, farm equipment, fencing, regulators for gas heaters and stoves, enameled signs, and air rifles and pistols. By 1906, Bergmann's factories were also manufacturing automobiles: the "Orient Express." But Bergmann's enterprise gained its international reputation for its small arms, especially its handguns.

In 1892, Theodor Bergmann was approached by Otto Brauswetter, a Hungarian watchmaker, with an idea for a locked-breech, self-loading pistol. This design, patented in Germany in 1892, had the trigger and hammer mechanism that was later incorporated into all of Bergmann's pistols. Being primarily an industrialist and entrepreneur, Bergmann needed a designer who could work out the details of the pistol and prepare it for manufacture. Louis Schmeisser (1848–1917) was just the man for this job. He took Brauswetter's idea, which had been patented by Bergmann, and refined it.

The first model to result from Schmeisser's work was a hesitation-lock self-loader in which the bolt recoil was delayed by an inclided surface in the frame. Only a handful of these Modell 1893 pistols were fabricated; one was tested by the Swiss in 1893.

FIGURE 8–1. Theodor Bergmann (1850–1931). ***(Chinn)***

Modell 1894

Having the benefit of the Swiss trials behind them, Bergmann and Schmeisser were able to make improvements in their Modell 1893, which resulted in the Modell 1894. This second pistol was a simple blowback weapon from which the hesitation-lock was eliminated. The Bergmann-Schmeisser Modell 1894—patented in Germany (1893), Britain (11,509, 1893), and the United States (547,454 of 8 October 1895)—had the recoil spring mounted beneath the barrel. The lock work of this handgun was quite similar to that of existing single-action revolvers; cocking of the hammer was accomplished by the movement of the recoiling bolt. Modell 1894 pistols were chambered to fire both rimmed and rimless catridges; the 8mm Bergmann rimless rounds also lacked an extraction groove. Very few of these Modell 1894 self-loaders were manufactured.

*Additional readings on German military handguns are listed in the notes at the end of this chapter.

Bergmanns Industriewerke G.m.b.H.
Telefon N° 1.
Telegramm-Adresse:
Industriewerke Gaggenau.

FABRIKMARKE

Musterlager in
Berlin, Hamburg, Wien, Zürich,
Brüssel, Paris, New-York, Madrid,
Mailand, Warschau, Bucarest, London.

Waffenfabrik in Suhl.
Prämiirt
Chicago, Darmstadt, Kiel, Ulm a/D, Lübeck, Strassburg,
Frankfurt a/M, Bad-Harzburg, Wiesbaden, Hamm.

Uebersicht der verschied. Fabrikationszweige:
I. Emailbilder und Baudecorationen.
II. Email-Reclame-u. Schriftenschilder.
III. Emailfüllungen für Möbel, Herde, Oefen etc.
IV. Luftgewehre und Munition.
V. Bergmann-Pistole (Selbstlader, 10 Schuss in 3 Sekunden.)
VI. Automatische Waarenverkäufer aller Art.
VII. Schmiedeisengeländer, s. g. „Herkuleszaun".
VIII. Motorfahrzeuge „Orientexpress"
IX. Sägmühle und Kistenfabrik."
X. Electrische Apparate.

Gaggenau, den: 25th October 1906.
(Baden)

The chief of Ordnance,
U. S. Army,
Washington. D. C.

FIGURE 8–2. The Bergmanns Industriewerke as illustrated on a company letterhead in 1906. ***(National Archives)***

Modell 1896

As so often was the case in handgun design, the first attempt by Bergmann and Schmeisser to create a self-loader had its shortcomings. This led to the improvement of the Modell 1894 pistol, which led to the Modell 1896. There were three basic versions of the Modell 1896: the 5mm No. 2, the 6.5mm No. 3, and the 8mm No. 4. Approximately the first 1,000 Modell 1896 pistols were chambered to fire the rimless and grooveless-type cartridges, hence the pistols did not have extractors. Although an extractor is not essential in a blow-back-type self-loader, Bergmann and Schmeisser discovered that an extractor was useful to insure the proper functioning of such arms when dirty. An estimated 4,400 No. 3 and No. 4 pistols were manufactured, while about 1,500 to 2,000 No. 2 pistols were fabricated. The few hundred No. 4 pistols built appear to have been undertaken as an attempt to interest military forces in this pistol. The common defect of all of the Bergmann-Schmeisser Modell 1896s was the inadequate power of the cartridges. The 5mm cartridge was roughly comparable in power to the 6.35mm Browning (.25 ACP); the 6.35mm Bergmann round was less powerful than the 7.65mm Browning (.32 ACP); while the 8mm Bergmann was only slightly more powerful than the 7.65mm Browning. To capture the interest of military services, a more suitable ammunition would have to be developed.

As in its predecessor, the Modell 1894, the Modell 1896 pistol could be loaded either with loose cartridges or with rounds contained in a clip through a movable plate on the feed device. If loaded by clip, the clip had to be removed before the pistol was fired. Opening the side plate moved the follower out of the way so that the cartridges could be loaded. When the side plate was closed it freed the follower. The follower then pushed upward on the cartridges so they would feed one after another.

Modell 1897

To improve the appeal of their handguns to potential military buyers, Bergmann and Schmeisser once again went back to their drawing boards. They had two goals: a more powerful cartridge and a locked-breech version of their basic pistol. The cartridge they developed was similar in dimensions and power to the 7.63 × 25mm ammunition used with the Mauser C96 pistol. Bergmann and Schmeisser called their cartridge the 7.8mm Bergmann to differentiate it from the Mauser round. These two cartridges had different case contours, but both were nominally 7.63mm in caliber. The Modell 1897 pistol had a laterally-displaced bolt, protected by German patent 98,318 of 1897 (British patent 17,251 of 1897). When fired, the barrel and the bolt recoiled together for a short distance until the bolt was pushed sideways to the right. Once unlocked the bolt was free to complete its recoiling cycle during which the empty case was extracted and ejected. The bolt had a sliding dust cover like the Modell 1896. Other

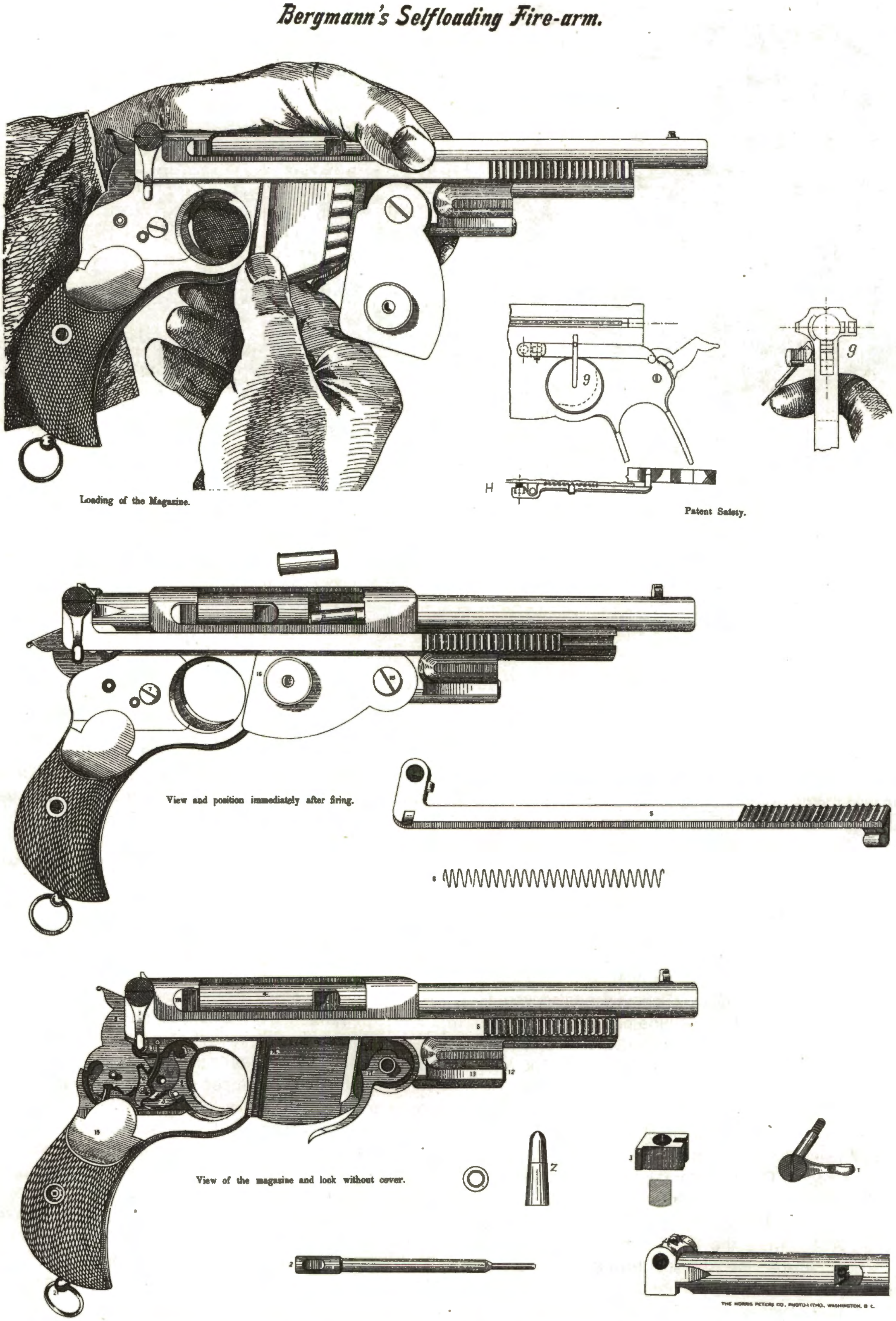


FIGURE 8–3. A contemporary engraving illustrating the Modell 1894 Bergmann-Schmeisser self-loading pistol. ***(Smith)***

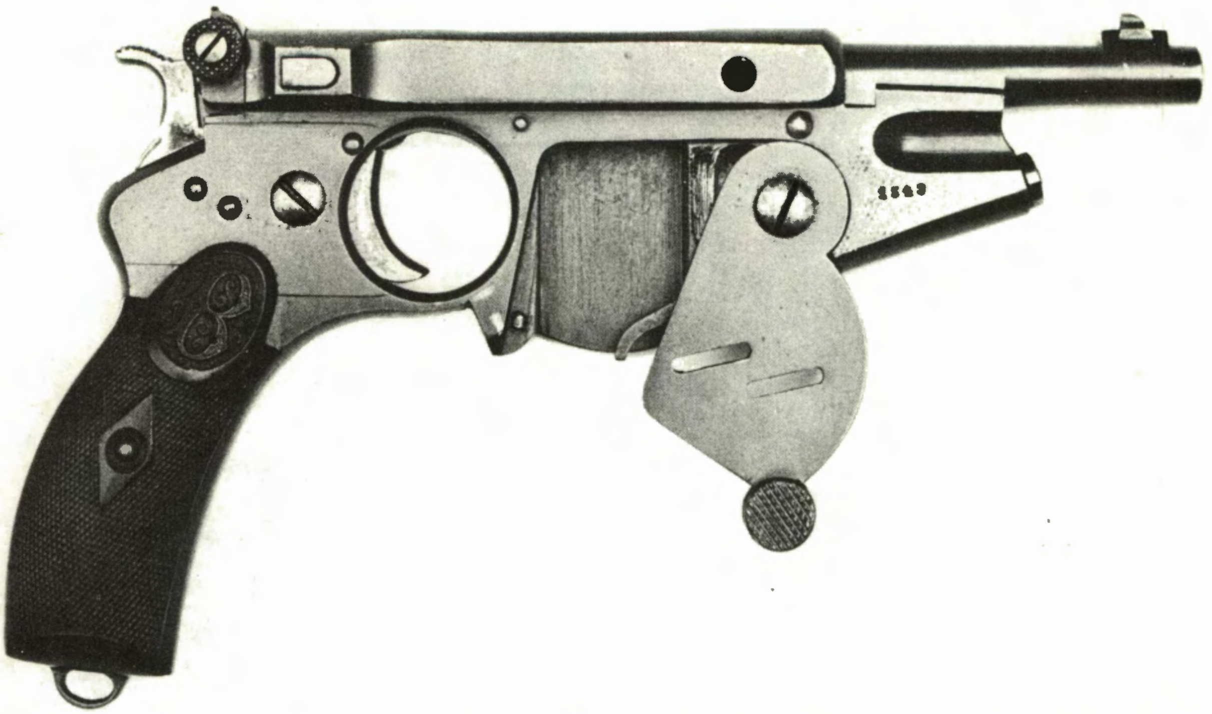


FIGURE 8–4. A 5mm No. 2 Bergmann-Schmeisser Modell 1896 pistol, serial number 1543, as fabricated by V. C. Schilling of Suhl. Note the manner in which the feed device side plate opened. *(Tokoi)*

similarities between the two models included the hammer and trigger mechanisms and the safety system. Both models also had the same means of attaching the shoulder stock-holster. A major change was the incorporation of a two column, detachable box magazine that could be loaded with a charger clip while in the pistol or with individual cartridges when detached. The rear sight was optimistically graduated up to 1,000 meters.

Commercially and militarily, the Modell 1897 Bergmann-Schmeisser was a failure. Most of the approximately 800 that were made went to commercial customers. The British military tested a 10mm version of the Modell 1897 in 1902 (see chapter 11), but they rejected it because they wanted a weapon that would handle at least an 11mm projectile. The Modell 1897 was often called the No. 5 Bergmann; retroactively the Modell 1894 was designated the No. 1. In the years following the introduction of the Modell 1897, Bergmann and Schmeisser experimented with a number of pistols; most were ultimately abandoned. Two models had a limited degree of success: the Bergmann Simplex and the Bergmann Mars of 1903.

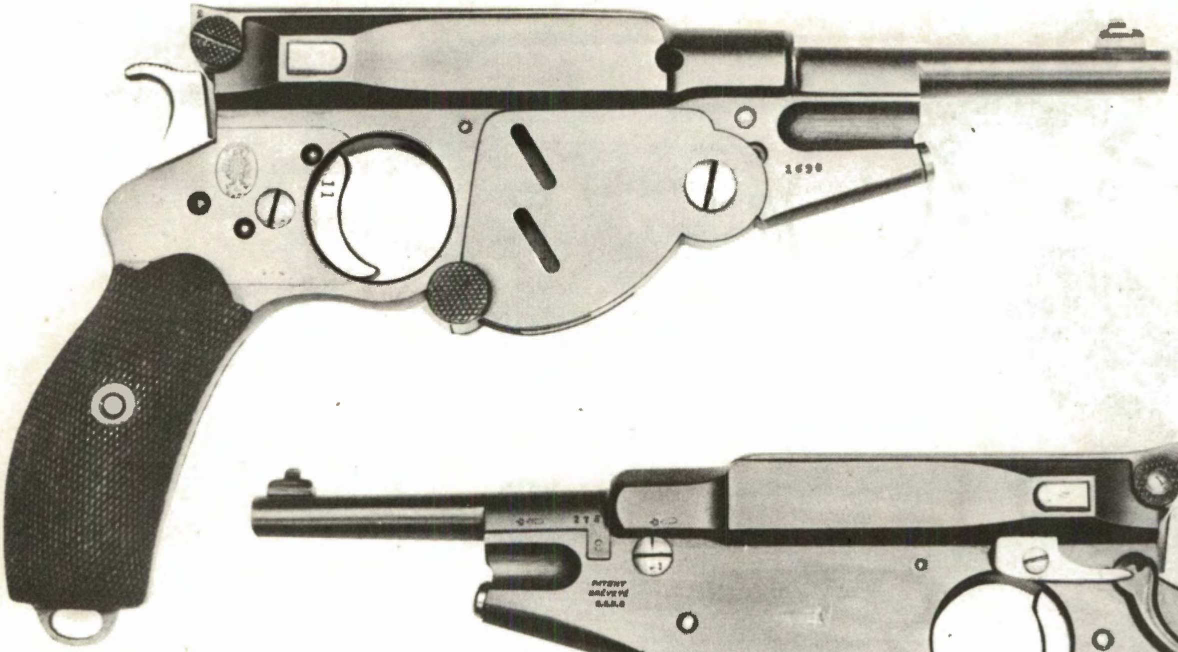
Bergmann Simplex

First introduced as the Bergmann Selbstlade Pistole Modell 1901, the 8mm Bergmann Simplex looked like a scaled-down Modell 1897; but in the Simplex, the designers reverted to a simple blowback mechanism. The initial Modell 1901s were probably made in Germany by V. C. Schilling of Suhl. After 1902, production appears to have shifted to Belgium. An attempt to capture part of the "pocket pistol" market, Simplex pistols were not generally made of very high quality materials and the workmanship was usually poor. There have been Spanish-made versions of the Simplex as well. It is estimated that 4,000 Simplex models were built, but that could be a substantial underestimation. Unfortunately for the Bergmanns Industriewerke and its licensees, pocket pistols such as the FN-Browning were much more popular and successful. Bergmann's tenacity finally paid off with the creation of the 1903 Mars pistol, which was adopted in slightly different forms by the Spanish and Danish governments.

Bergmann Mars of 1903

In 1901, Theodor Bergmann patented a machine gun embodying a vertically-moving locking piece that was located toward the rear of the bolt. This locking system was also applied to a new handgun, a variant of the Modell 1897 No. 5 pistol. Bergmann dubbed this new self-loader the *Mars;* it was also called the No. 6 pistol. Prototypes were built that fired several different cartridges, but the production models were chambered for the *9 × 23mm Bergmann No. 6* cartridge. This ammunition, which became known as the *9mm Bergmann Bayard* in northern Europe and *9mm Largo* in Spain, was quite powerful and met the requirement for a military round with more punch than the 9 × 19mm Parabellum. The Modell 1903 Mars pistol, as the weapon was known commercially, had a good locking mechanism and could withstand the recoil fórces produced by this potent cartridge.

Bergmann was cautious in his preparations to manufacture the Modell 1903 Mars. He wanted a large order before he tooled up to mass produce his newest handgun. Likely, he was worried that the orders for his gun would not justify



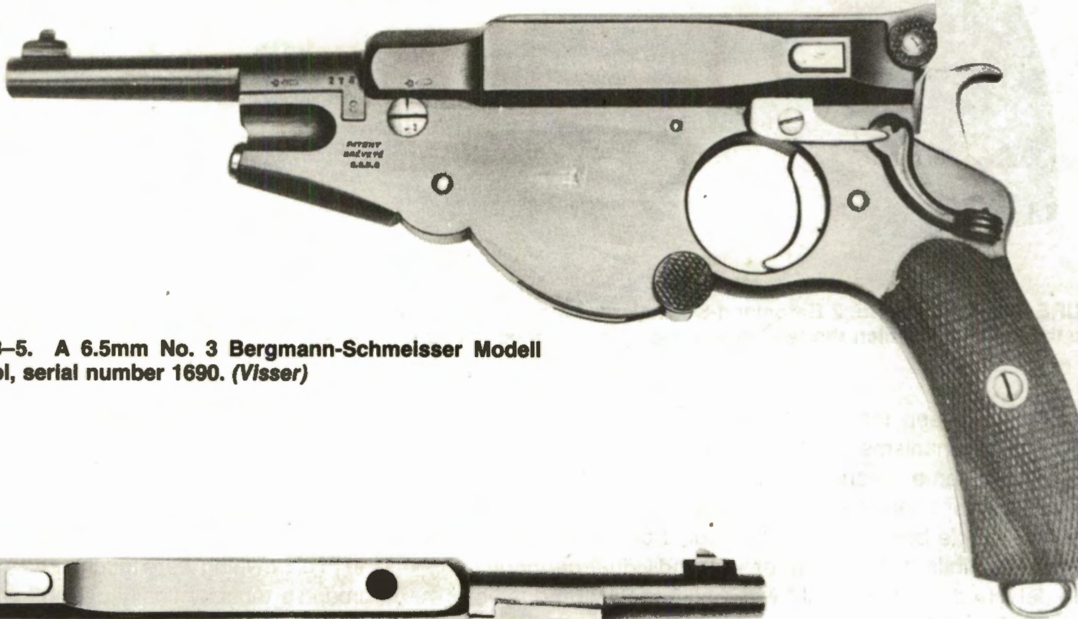
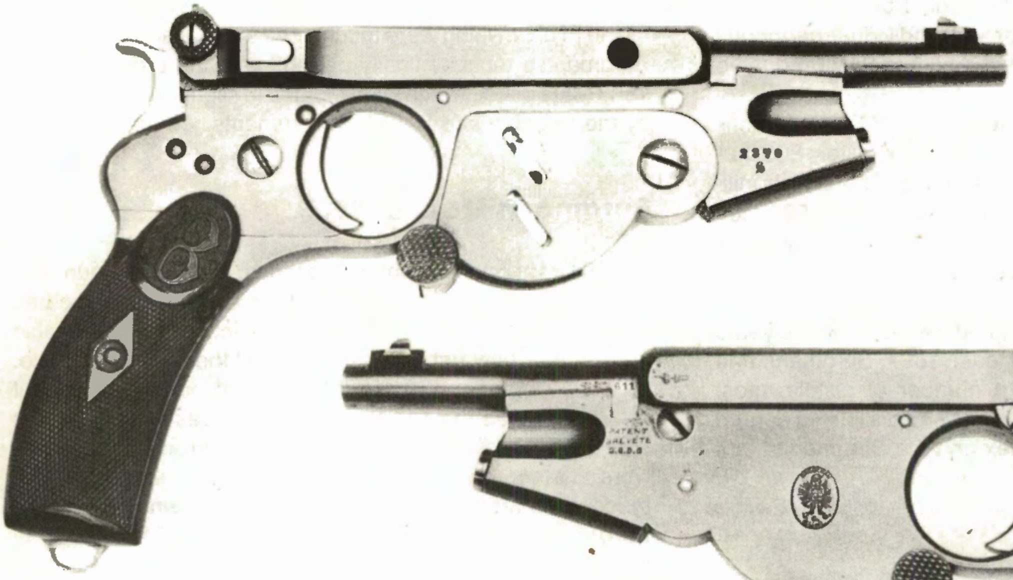


FIGURE 8–5. A 6.5mm No. 3 Bergmann-Schmeisser Modell 1896 pistol, serial number 1690. *(Visser)*



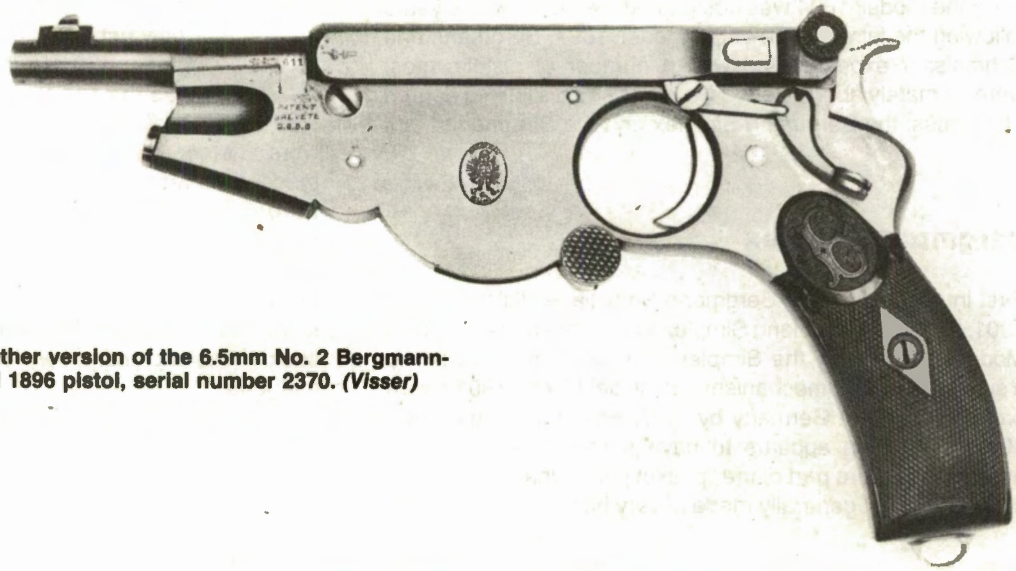


FIGURE 8–6. Another version of the 6.5mm No. 2 Bergmann-Schmeisser Modell 1896 pistol, serial number 2370. *(Visser)*

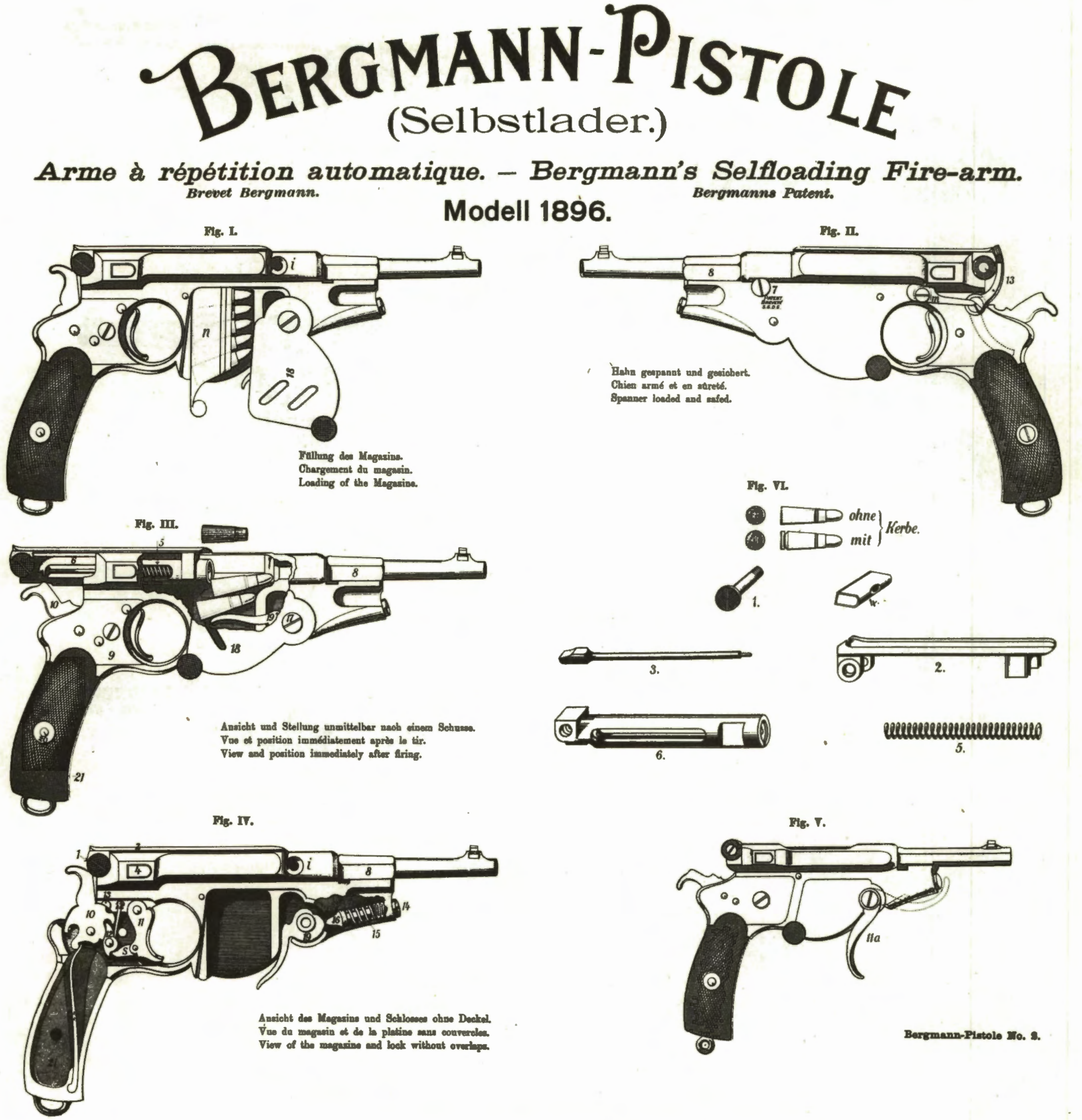


FIGURE 8–7. Bergmann's Modell 1896 Pistole. *(Bergmann)*

the capital investment in machine tools, jigs, fixtures and gauges. As a consequence of his caution, Bergmann was not able to immediately satisfy the requirements of the Spanish government when it adopted the Mars as the *Pistola Bergmann de 9mm Modelo 1905.* Bergmann subcontracted with V. C. Schilling & Cie. of Suhl to manufacture these Modelo 1905s. Late in 1904, the Schilling firm was taken over by the Heinrich Krieghoff organization. For reasons not explained, Krieghoff canceled the contract with Bergmann, thus leaving him with a contract and no means of fulfilling it. Only a few Modelo 1905s were delivered to Spanish authorities by 1908. By that time ordnance officials in Madrid decided that they wanted some modifications made to the basic design. Out of this Spanish evaluation process (see chapter 13) came the *Pistola Bergmann de 9mm Modelo 1908.* The most notable improvement was a better safety mechanism. Since the Spanish only needed 3,000 guns, Bergmann negotiated a licensing agreement with the well-established Societe Anonyme Anciens Etablissments Pieper (AEP) of Herstal, Belgium, whereby the Belgian manufacturer would make the pistols for Spain. AEP also received the right to market a commercial model of the Bergmann Mars 1903/1908, which

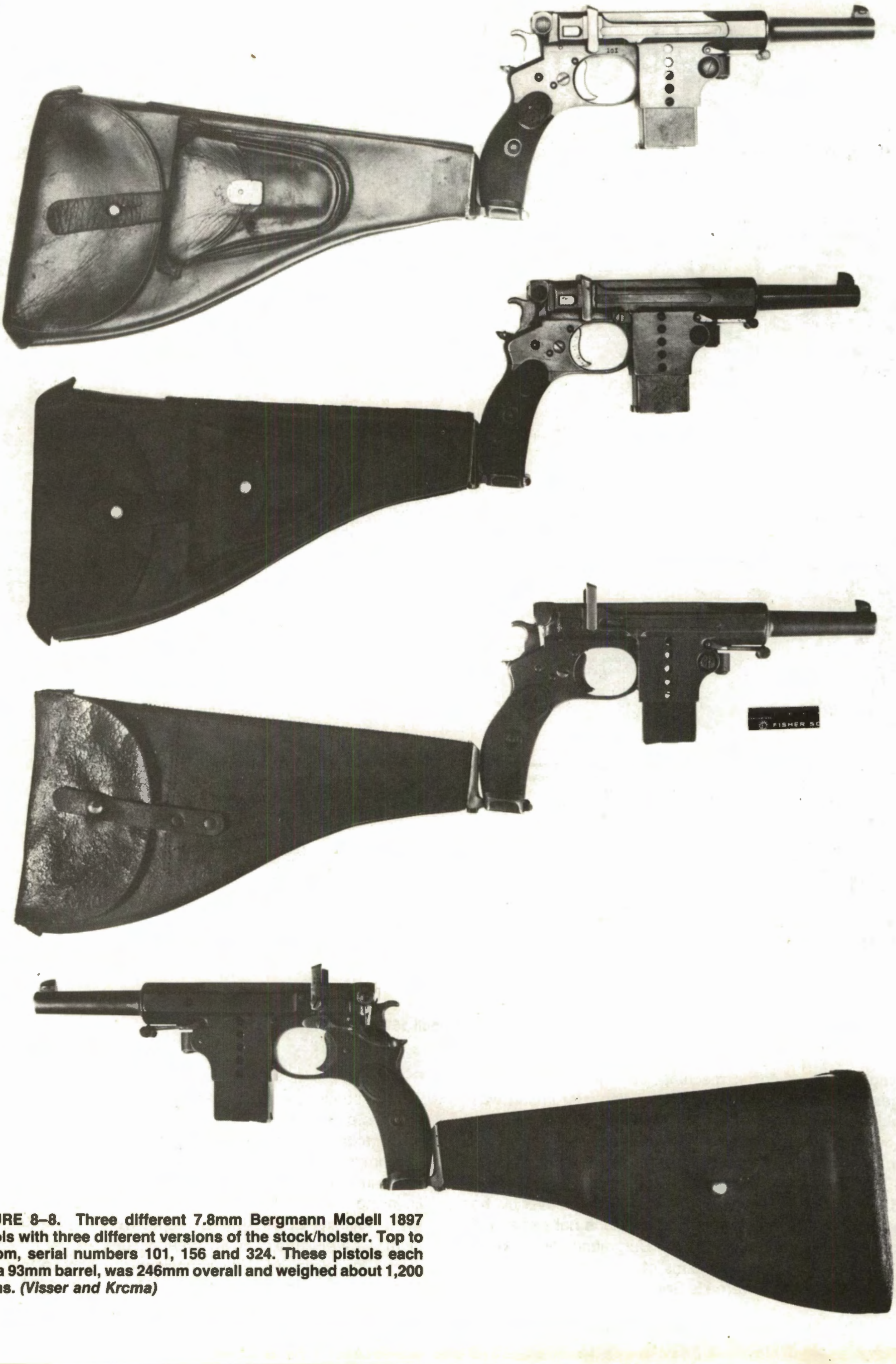


FIGURE 8–8. Three different 7.8mm Bergmann Modell 1897 pistols with three different versions of the stock/holster. Top to bottom, serial numbers 101, 156 and 324. These pistols each had a 93mm barrel, was 246mm overall and weighed about 1,200 grams. ***(Visser and Krcma)***

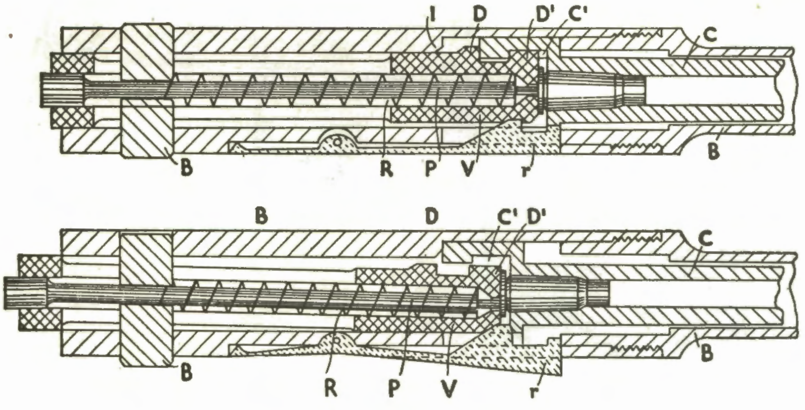
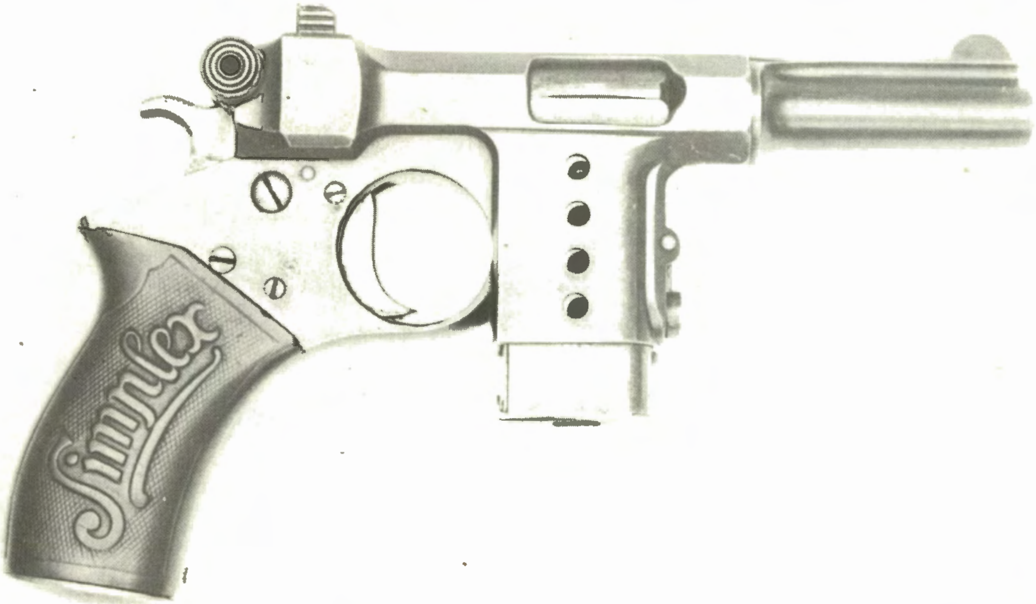


FIGURE 8–9. The locking mechanism of the Bergmann Modell 1897 pistol. Note the change of position of the bolt from the locked position *(top)*, and the unlocked position *(bottom)*. (Wilson)



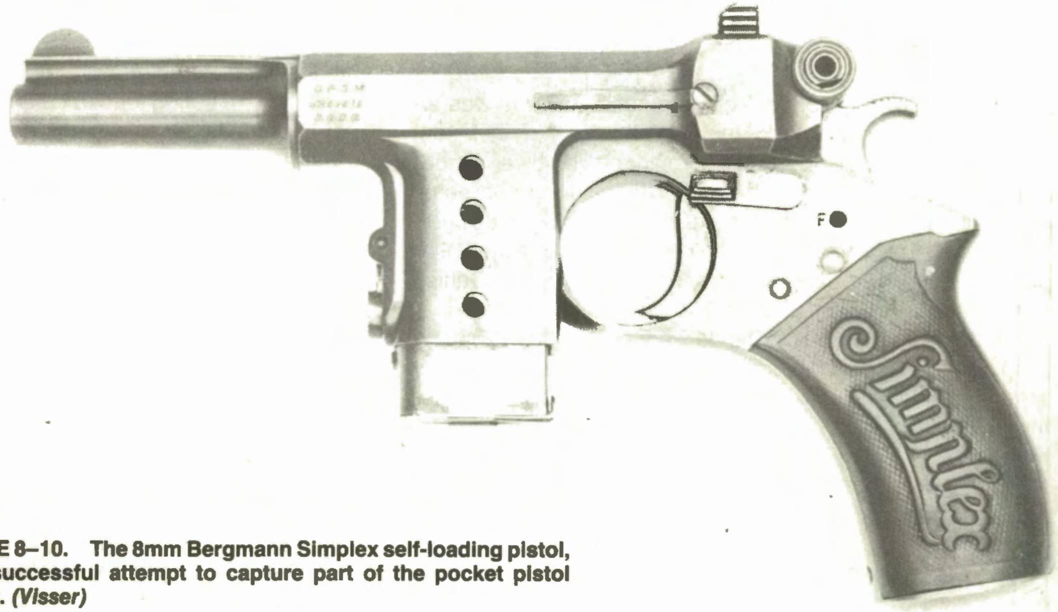


FIGURE 8–10. The 8mm Bergmann Simplex self-loading pistol, an unsuccessful attempt to capture part of the pocket pistol market. *(Visser)*

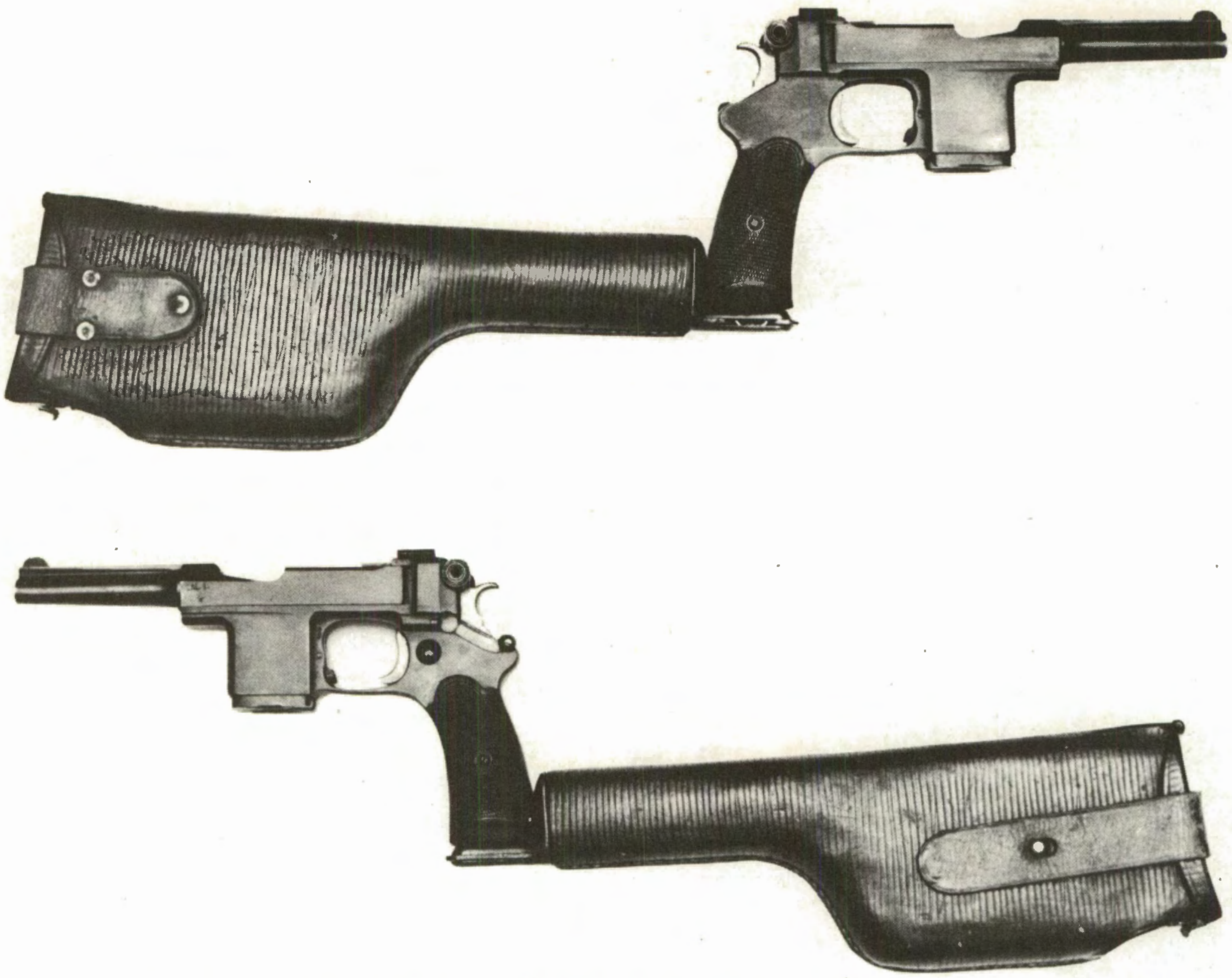


FIGURE 8–11. The 9 × 23mm Bergmann Mars pistol of 1903 with shoulder stock-holster. *(Visser)*

they sold with the trademark *Bayard;* and the self-loader was called the *Bergmann Bayard.* About 3,000 Modelo 1908 (Bergmann Bayard) pistols were delivered to Spain over the next few years.

AEP's second major sale of Bergmann Bayards was an order for 4,840 handguns for the Danish army. These Model 1910 Danish military pistols were distinguished by a few design changes: an S-shaped hammer mainspring and semicircular cuts in the bottom edge of the magazine housing to permit easier removal of the feed device. These Model 1910 pistols had both an AEP factory serial number and a Danish army acceptance number from 1 to 4,840.

World War I interrupted the delivery of Bergmann Bayard pistols from the AEP factory in Herstal. AEP was just one of several factories closed or operated by occupying forces after the German invasion of Belgium in 1914. The disruption of their pistol supply encouraged the Danish military authorities to manufacture the Bergmann Bayard domestically. They tooled up for production and began deliveries about 1921. These Model 1910/21 pistols were marked either *Haerens Tojhus* (Army Manufacturing Arsenal) or *Haerens Rustkammer* (Army Storage Arsenal) and remained the standard Danish side arm until the FN-Browning Modèle 1935 GP pistol was standardized in 1946.

Danish modifications to the basic Model 1910 included a redesigned extractor and bolt, a screw to retain the side plate instead of a spring loaded catch, and a more comfortable set of grip plates. Originally, the grip plates were made of *trolit,* a checkered synthetic material, but that plastic substance tended to chip and warp over time and the Danes decided that wooden grip plates were more serviceable. The Haerens Tojhus in Copenhagen manufactured about 900 pistols between 1922 and 1924. Another 1,300 pieces were completed at the Haerens Rustkammer between 1922 and 1925. A total of 2,204 or 2,209 Danish Bergmann Bayard pistols were fabricated. Most of the original Model 1910s were converted to meet the M. 1910/21 specifications. Altered pieces were stamped *M1910/21* beneath the AEP inscription on the left side of the barrel extension. It has been estimated that the total number of Bergmann Bayard pistols (Mars M. 1903, Spanish M. 1905 and M. 1908, Danish M. 1910 and M. 1910/21 and commercial models) was about 20,000.

Theodor Bergman's handgun activities were much less successful than he had expected them to be. He retired from

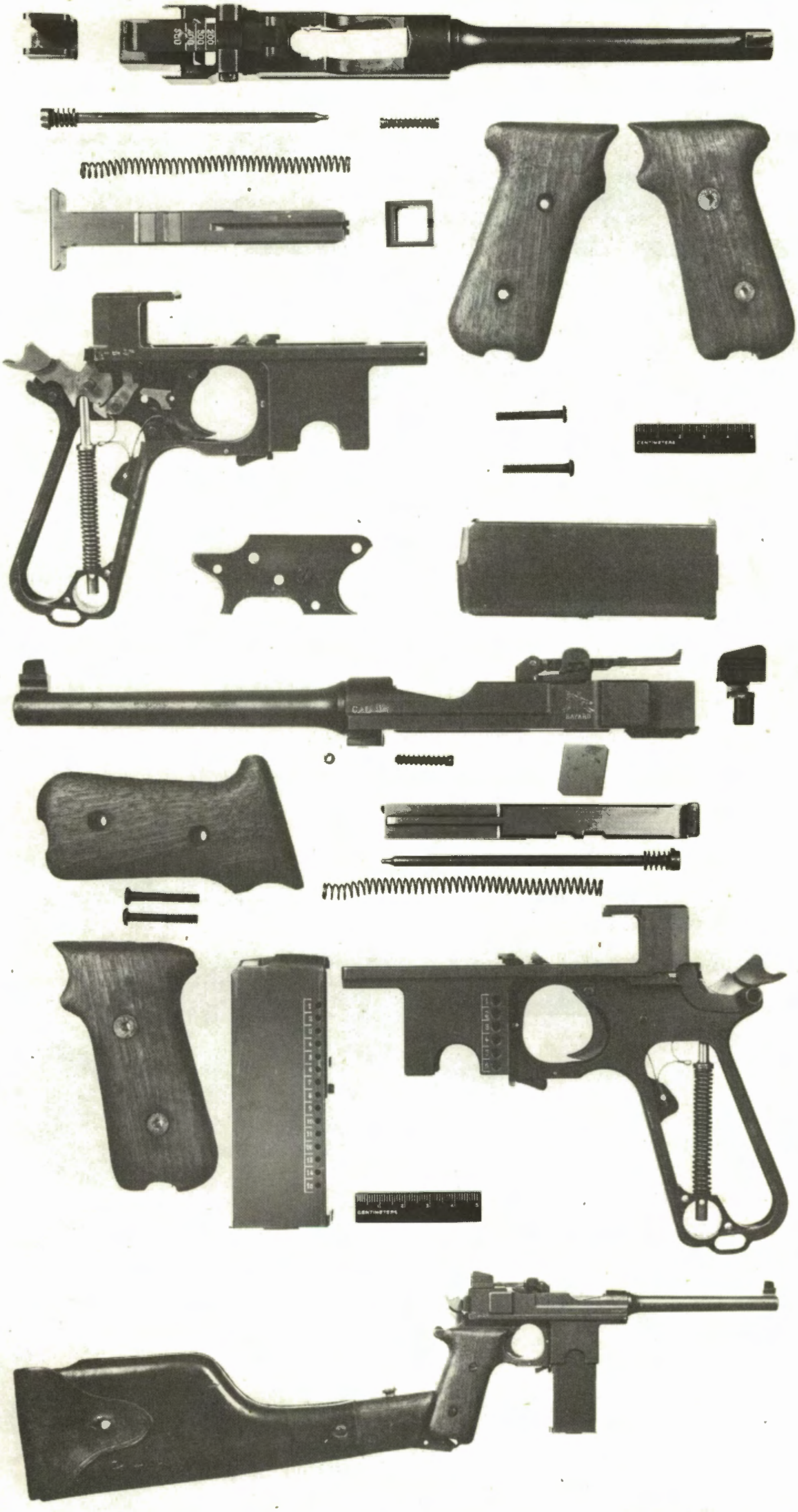


FIGURE 8–12. A Bergmann Bayard pistol made by the Societie Anonyme Anciens Établissments Pieper with an experimental 15-shot magazine. *(Krcma)*

FIGURE 8–13. The 9mm Bergmann Bayard built by AEP for the Danish army (Model 1910). This specimen, serial number 7903, had a 101mm barrel, was 253 overall without stock (600mm with stock), and weighed 966 grams. The standard magazine was 6 shots, but a 10-shot magazine could also be used. The rifling was 6 left. *(Krcma)*

the active management of Bergmanns Industriewerke in 1910, and he died 21 years later at the age of 80. Louis Schmeisser left the firm in 1921. His son Hugo contributed the MP 18 submachine gun to the company's product line; that weapon was the most successful weapon produced by Bergmann's operation. In 1921, the Bergmanns Industriewerke was sold to the Aktiengesellschaft Lignose, an industrial combine that grew out of the Pulverfabrik Lignose. A number of small caliber pocket pistols were manufactured by the firm after World War I, but none of these were ever seriously considered for military use. In the post World War II era the Bergmann firm was best known for its chemical products.

PAUL AND WILHELM MAUSER

Peter Paul and Wilhelm Mauser went into the firearms business in 1869 to build military rifles. Their rifles became world famous in the last years of the nineteenth century, and were the basic shoulder arm for many armies during the first half of the twentieth century. These men were the sons of Andreas Mauser, a master gunsmith at the Königlichen Gewehrfabrik in Oberndorf an Neckar. Wilhelm was born on 2 May 1834, and Paul was born on 27 June 1838. As young boys, Paul and Wilhelm worked part-time in the Gewehrfabrik. After graduation from high school the Mauser brothers worked full time at the rifle factory. Following a short tour of duty in 1859, Paul was placed on inactive status and assigned back to the Gewehrfabrik. Eight years later, during a period of layoffs at the Gewehrfabrik, the brothers went to Liège to work for Samuel Norris, who was also the Remington Arms Company representative in Belgium. In Liège they worked on perfecting a single-shot bolt action rifle, which was jointly patented by Norris and the Mausers (U.S. Patent 78,603 of 2 June 1868).

Paul and Wilhelm returned to Oberndorf in 1869 when Norris stopped providing them with the financial support they needed. They set up a small workshop in the home of Paul's father-in-law. Within two years, on 2 December 1871, the Prussians adopted a Mauser single-shot rifle as the *Infanteriegewehr Modell 1871.* This began a long association between the German state and the Mauser brothers. In the summer of 1872, the Gebrüder Mauser, the name of the firm until 1884, began construction of a rifle factory in Oberndorf. Until his death on 29 May 1914, Paul Mauser concentrated on the perfection of the military rifle. He did take time out to work on handgun designs, but side arms were a secondary interest. Perhaps that explains why he was not as successful in this field of endeavor.

C. 1877 Pistole

As with his rifles, Paul Mauser began his pistol experimentation with a single-shot piece. This 9mm falling-block handgun was somewhat unusual in that it had an internal hammer. The breech block was opened by a thumb-operated latch situated in the place normally occupied by the hammer. On depressing the latch, the breech block was lowered into the frame. The hammer was cocked during the opening of the breech. Mauser introduced his single-shot pistol the same year that Ludwig Löwe & Cie. of Berlin began to manufacture their version of the Smith & Wesson Russian model pistol. As a result of its late debut, the C. 1877 was not a success. Examples of this intriguing single-shot pistol are very rare.

C. 1886 Pistole

Mauser introduced a magazine repeating pistol, the C. 1886, 9 years later (fig. 3–10). It was technologically equal to progress being made at other factories, but it did not represent a practical alternative to the military revolver. This repeater had a tubular magazine located beneath the barrel. Few if any of these pistols were built.

Mauser Revolvers

Paul Mauser also experimented with revolvers. In 1878, the Gebrüder Mauser introduced a solid-frame, gate-loaded, rod-

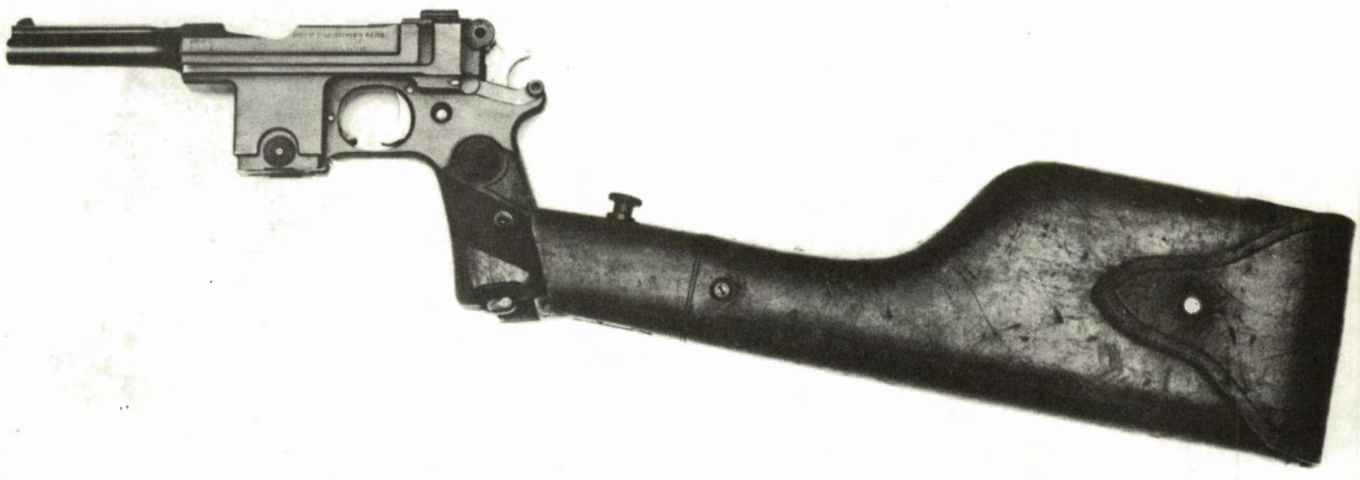


FIGURE 8–14. The Danish Model 1910 with shoulder stock-holster. *(Visser)*

FIGURE 8–15. A 9mm Bergmann Bayard Model 1910/21 pistol built at the Danish Haerens Rustkammer with serial number 6416. Note the *Trolit* grip plates. *(Krcma)*

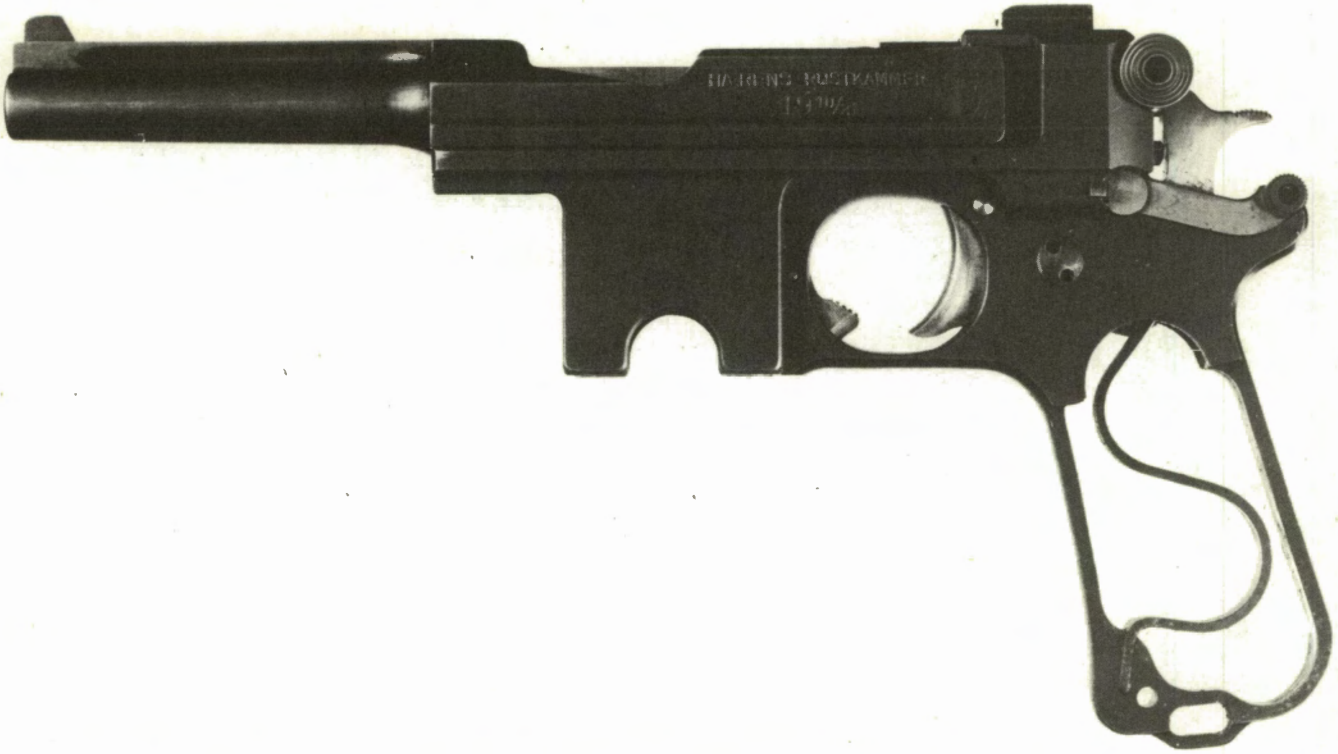


FIGURE 8–16. The mainspring of the Danish Model 1910 and 1910/21 was distinguished by its S shape. *(Krcma)*

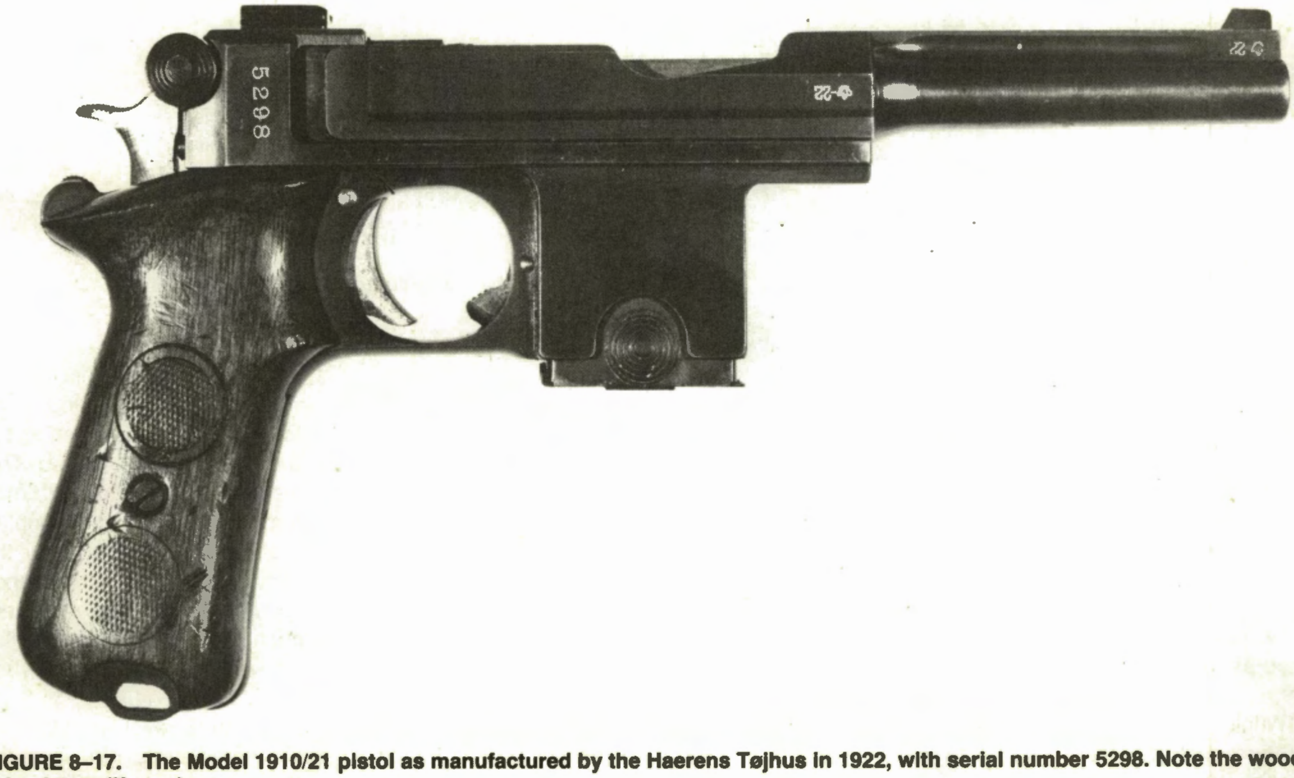


FIGURE 8–17. The Model 1910/21 pistol as manufactured by the Haerens Tøjhus in 1922, with serial number 5298. Note the wooden grip plates. *(Krcma)*

Pistol 1910.

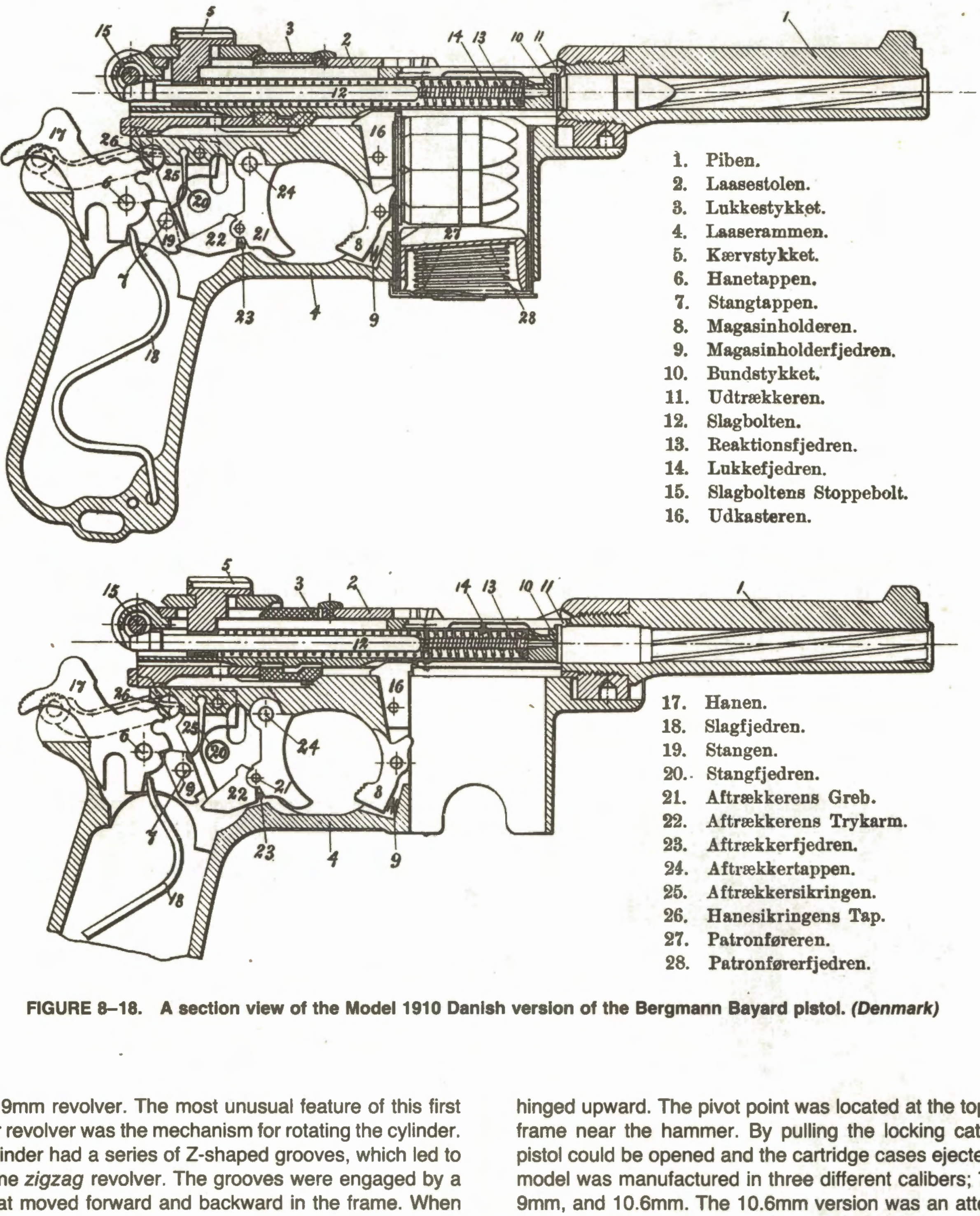


FIGURE 8–18. A section view of the Model 1910 Danish version of the Bergmann Bayard pistol. *(Denmark)*

ejector 9mm revolver. The most unusual feature of this first Mauser revolver was the mechanism for rotating the cylinder. The cylinder had a series of Z-shaped grooves, which led to the name *zigzag* revolver. The grooves were engaged by a stud that moved forward and backward in the frame. When the hammer was cocked, either single-action or double-action, the stud moved forward to rotate the cylinder one-sixth of a turn. When the hammer was released, the stud returned to the rear following one of the straight grooves. The stud acted as a cylinder-locating piece during the fall of the hammer.

Within a short time the Mausers introduced a hinged-frame revolver that they also called the Modell 1878. Unlike most tip-open revolvers, the Mauser design had a barrel that hinged upward. The pivot point was located at the top of the frame near the hammer. By pulling the locking catch, the pistol could be opened and the cartridge cases ejected. This model was manufactured in three different calibers; 7.6mm, 9mm, and 10.6mm. The 10.6mm version was an attempt to convince the German army to adopt a replacement for the 10.6mm solid-frame Reichsrevolver. Government ordnance experts were wary of the complexity of the Mauser hinged-frame and cylinder revolving mechanisms. Mauser sold rifles to the German army, but the firm was not as fortunate when it came to handguns.

There was a third model of the 1878 revolver called the *Neuerungen an Revolvern,* or improved model. Similar to the earlier hinged-frame version, this model had a different type

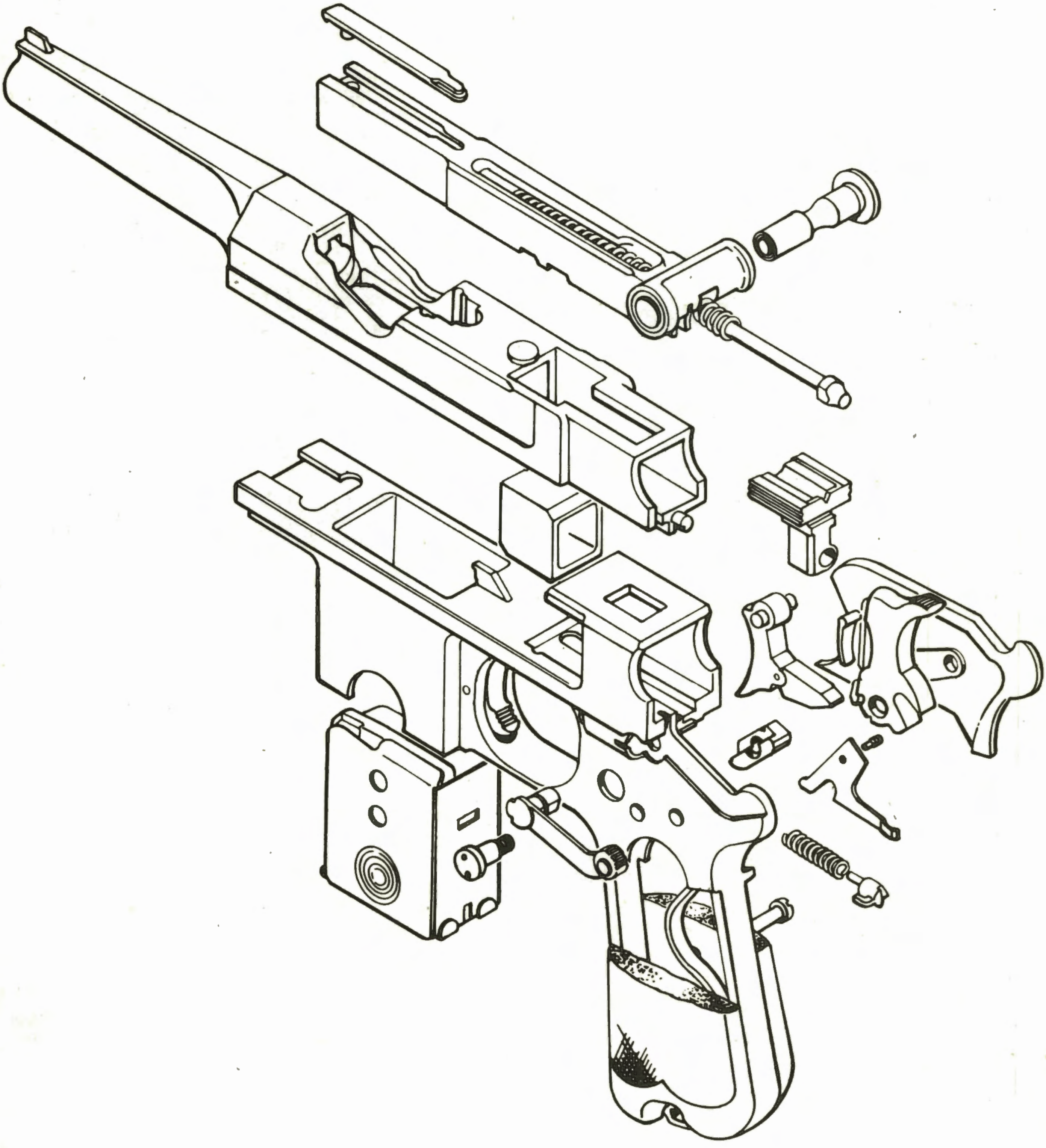


FIGURE 8–19. An exploded view of the Danish Model 1910/21 Bergmann Bayard pistol. *(Bravermann)*

FIGURE 8–20. Peter Paul Mauser (1838–1914). *(Smith)*

FIGURE 8–21. Wilhelm Mauser (1834–1882). *(Smith)*

ex D.R.P. 1192.

Verbesserungen an Hinterladungs-Feuerwaffen.

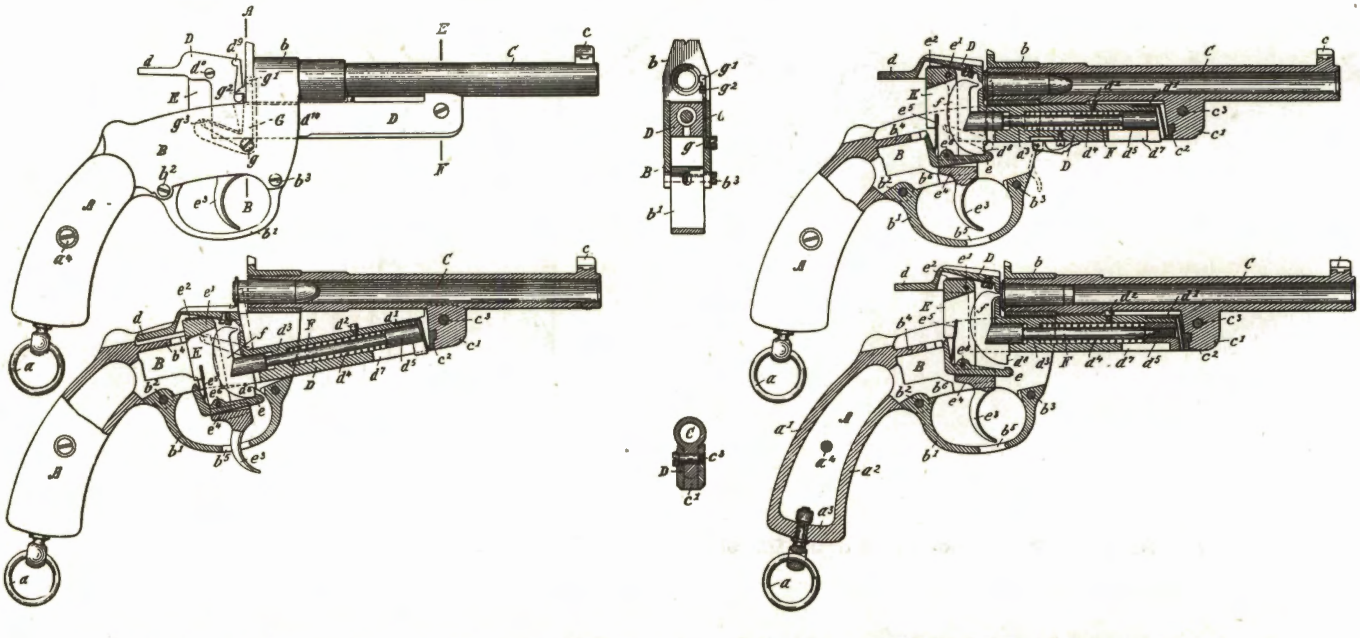
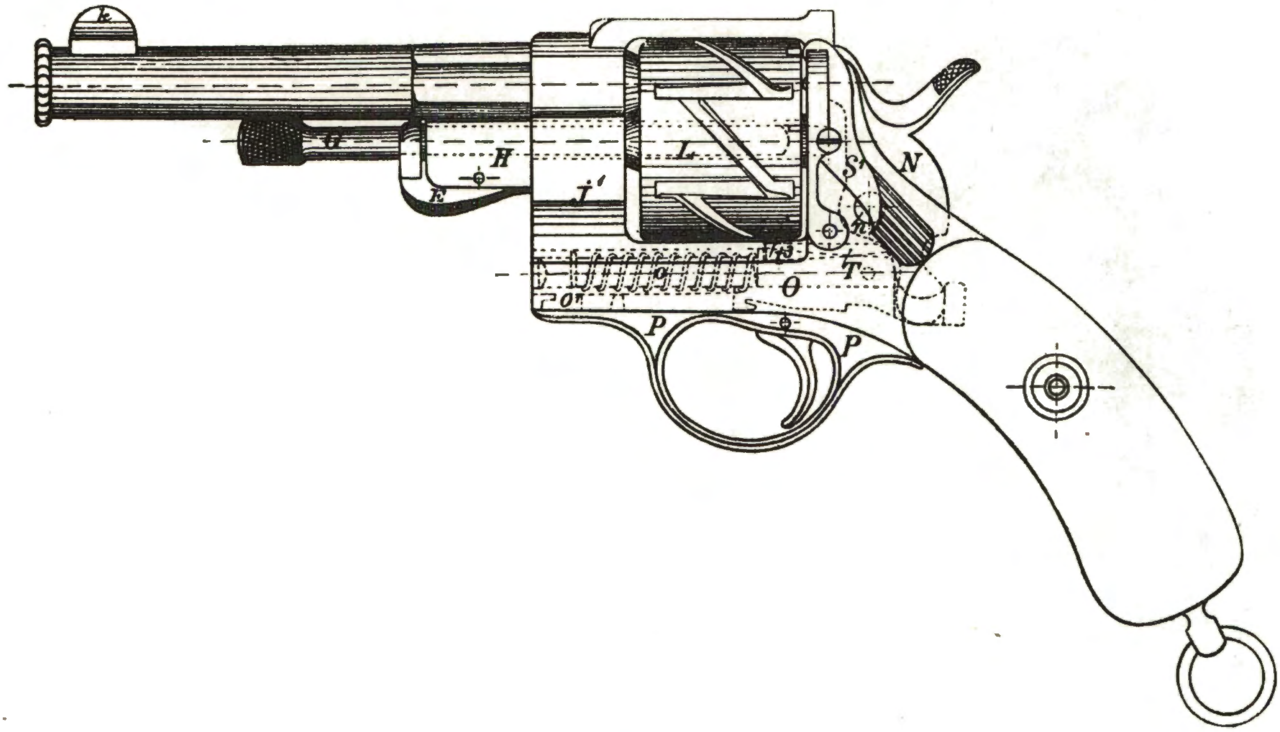


FIGURE 8–22. Paul Mauser's C. 1877 Pistole as illustrated in Deutsches Reich Patent 1,192 of 7 August 1877. *(Korn)*

FIGURE 8–23. The Mauser 9mm C. 1877 Pistole. This example does not have a serial number. It is marked on the left side of the frame Patent Gebr Mauser & Cie Oberndorf a/n Wurttemberg 1876. It had a 170mm barrel and was 268mm overall. ***(Visser)***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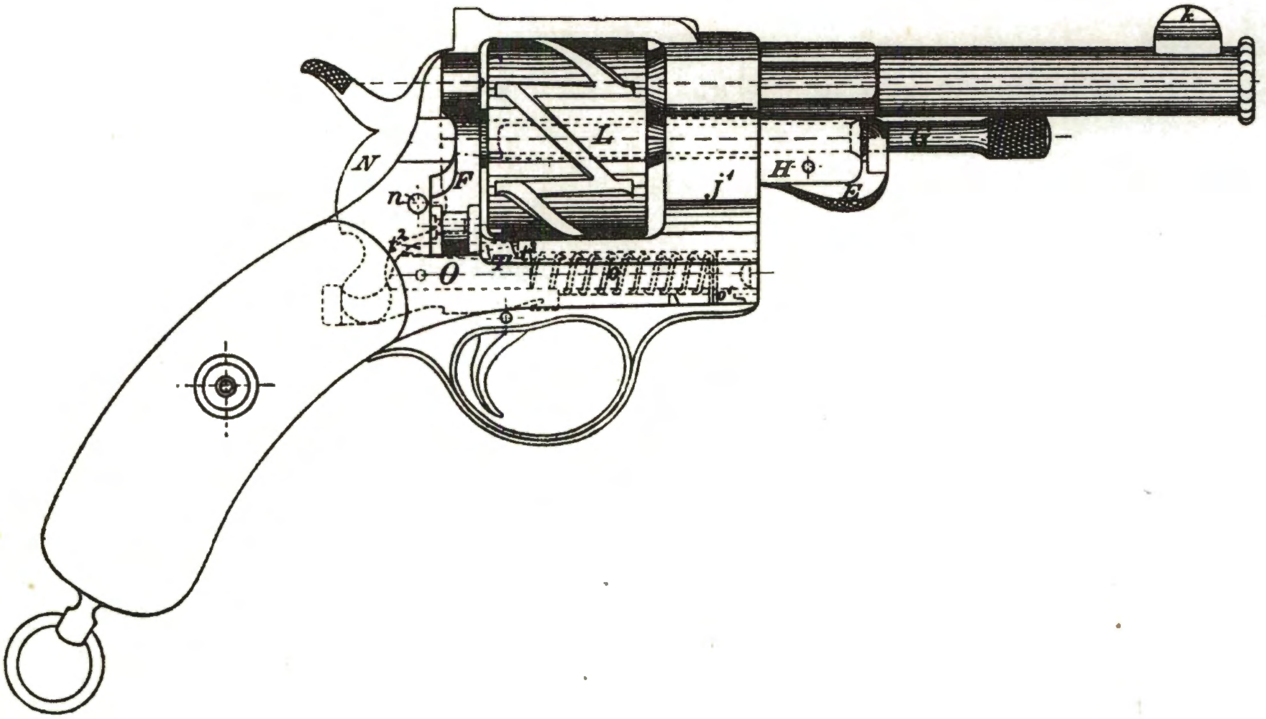
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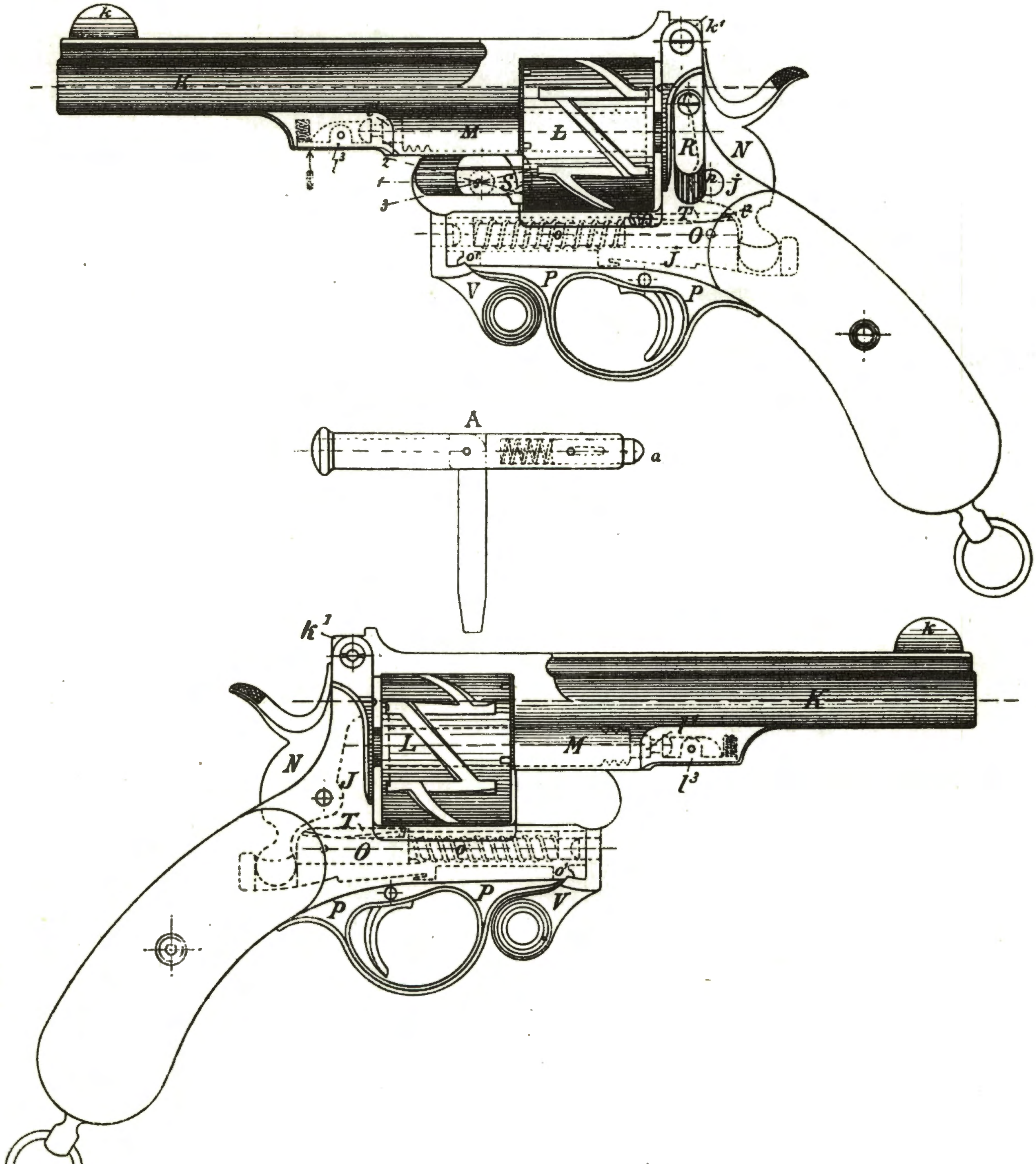


FIGURE 8–24. **The two early versions of the Mauser 1878 revolver.** ***Left,*** **the solid-frame 9mm model.** ***Right,*** **the first hinged-frame model; it was made in 7.6mm, 9mm, and 10.6mm.** ***(Korn)***

FIGURE 8–25. The hinged-frame 1878 Mauser revolver. *(Metropolitan Police Forensic Laboratory and Hogg and Weeks)*

ex D. R. P. 2564.

Neuerungen an Revolvern.

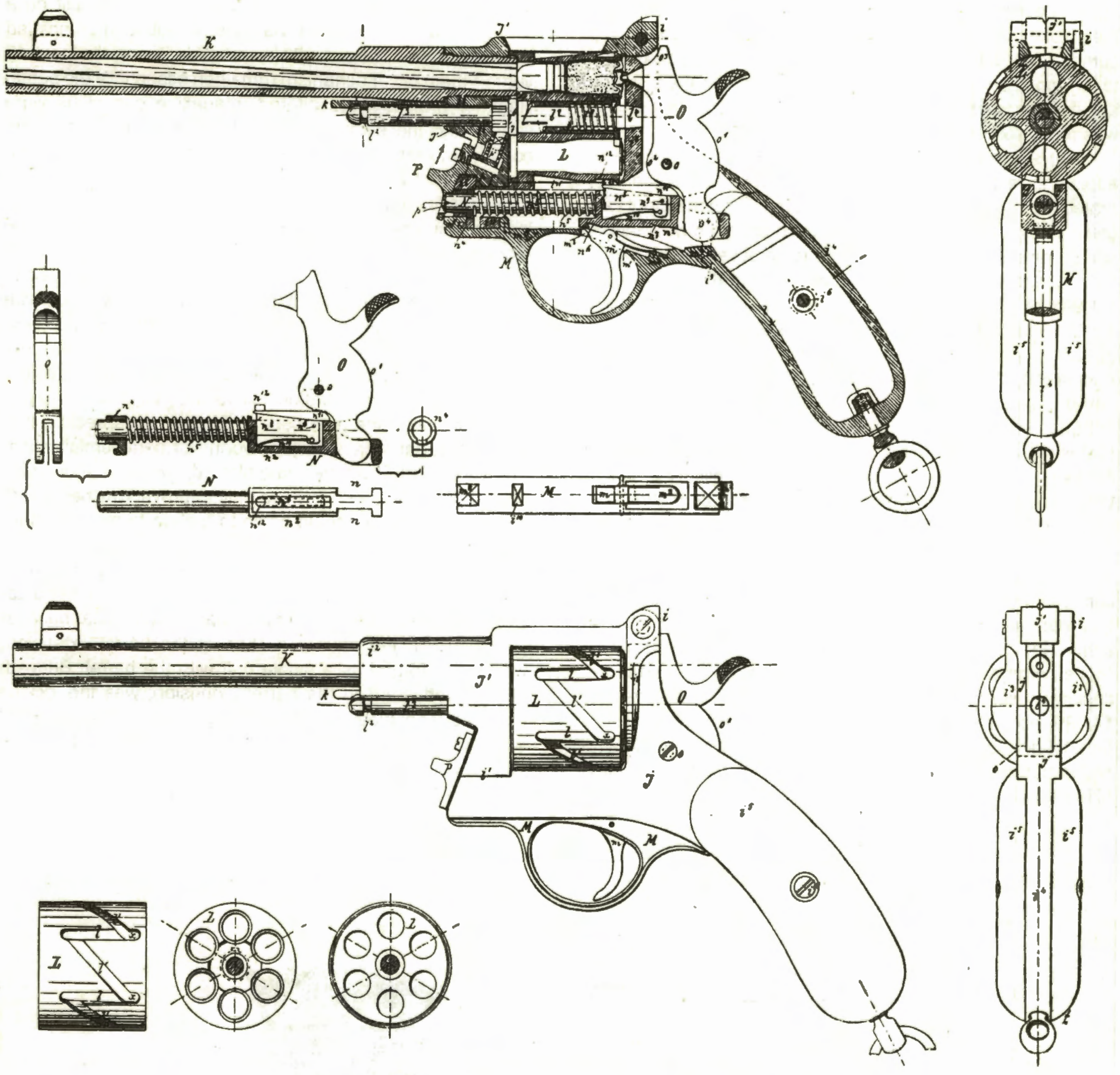


FIGURE 8–26. The Mauser 1878 improved model revolver. ***(Korn)***

of frame locking system. All three Mauser revolvers had a unique lock mechanism in which the hammer was fitted to a sliding assembly beneath the cylinder. The cylinder rotating stud was mounted on this same sliding piece. Although interesting from a design standpoint, none of the Mauser revolvers were commercially successful. Eight years later, the Mausers experimented with their C. 1886 mechanical repeater. Then after a six-year hiatus, they began to support the development of a self-loading pistol.

C. 96 Pistol

Construktion 96, better known as the 1896 Mauser broomhandle pistol, was not a Mauser design. Appearance of the Borchardt C93 pistol had encouraged many arms manufacturers to consider the development of a self-loading handgun. Therefore, Paul Mauser (Wilhelm had died in 1882) decided to develop such a weapon. Most of the credit for creating the C. 96 goes to the three Feederle brothers—Fidel, Friedrich, and Josef. For many years Fidel was the superintendent of

the experimental workshop at the Mauser factory. He and his brothers, who also worked in the model shop, had been experimenting with their self-loading pistol design for some time before Paul Mauser gave it his official blessing. Unofficially, their work on the C. 96 began sometime in 1893, and by the summer of 1894 they had a pilot model. During the next eight to ten months the Feederle brothers worked on the pistol as an official project. The handgun that resulted from this activity was ready for test-firing on 15 March 1895.

After success in firing the new self-loader, Paul Mauser applied for a patent covering the mechanism of a recoil-operated firearm (*Rückstosslader*), and the German patent was granted on 11 December 1895. Subsequently, Mauser sought patent protection for his pistol in several other countries: Belgium (119,462 of 9 January 1896), Switzerland (11,943 of January 1896), France (253,098 of 10 January 1896), Britain (959 of 14 January 1896), Norway (4,780 of 22 January 1896), Hungary (5,675 of 29 February 1896), Austria (49,903 of 11 March 1896), Italy (40,594 of 30 March 1896), Spain (18,582 of 9 May 1896), Brazil (2,088 of 28 July 1896), Denmark (925 of 19 January 1897), and the United States (15 June 1897). Mauser obviously thought that the C. 96 pistol had considerable commercial and military promise. With patents in hand, the next step was the perfection and manufacture of the pistol.

A second prototype of the Mauser self-loader appeared in about November 1895. This handgun had a few minor changes, the most obvious one being the switch from a spur-type hammer to one with a circular profile and "cones" on either side. These conical projections led to the nickname "cone hammer model." This feature was kept as part of the design of commercial models up to about serial number 14,999 (above serial number 11,000 there are some pistols that did not have cone hammers). Experience with this second prototype encouraged Paul Mauser to initiate production of the pistol. Preproduction engineering occupied the months January to October 1896. During this period about 110 units of various configurations were fabricated by hand and partially mechanized processes. By early 1897, the M/96 (the marketed version of the C 96) pistol was being built on a mass production basis. Of the several thousand completed during that year, over 1,000 were sold. During the next 43 years,* the basic mechanism remained essentially the same. Hammer profiles were altered, magazine capacities were varied, and the external configuration was changed to accommodate modifications in production techniques, but the basic product was the same.

Examples built between January and October of 1896 included five basic types: 6-, 10-, and 20-shot magazine models, an experimental 6mm model, and a 10-shot Karabiner (carbine). One of the 10-shot pistols was presented to Kaiser Wilhelm II in August 1896. Because these prototype guns were intended to be used with a shoulder stock-holster, there was a slot on the backstrap of the pistol's grip. Test-firings of prototype C. 96s at the Ludwig Löwe & Cie. factory in July and the demonstration held for the Kaiser on 20 August 1896 convinced the members of the board of directors that this self-loader was a project worthy of commercialization. The Löwe firm, it will be remembered, owned a substantial portion of the Mauser stock, so their approval was necessary before Paul Mauser could begin to tool-up to manufacuture his pistol.

The operating mechanism of the M/96 pistol was relatively straightforward, but it was also relatively difficult to manufacture. This locked-breech handgun had a rectangular bolt that moved within the square section of the barrel extension, which was forged as a single unit with the barrel. Beneath the bolt, attached to the barrel extension, was the locking piece—a steel block—with a locking lug that engaged a slot in the lower surface of the bolt. Sometime in late 1896, the

*Production at the Oberndorf factory ceased in 1939.

FIGURE 8–27. This was the C. 96 prototype pistol fired on 15 March 1895. The date of the first shooting was added to the gun at a later date. It had no serial number, and was chambered to fire the 7.65mm C93 Borchardt cartridge. *(Krcma)*

ex D. R. P. 90430.
Rückstosslader.

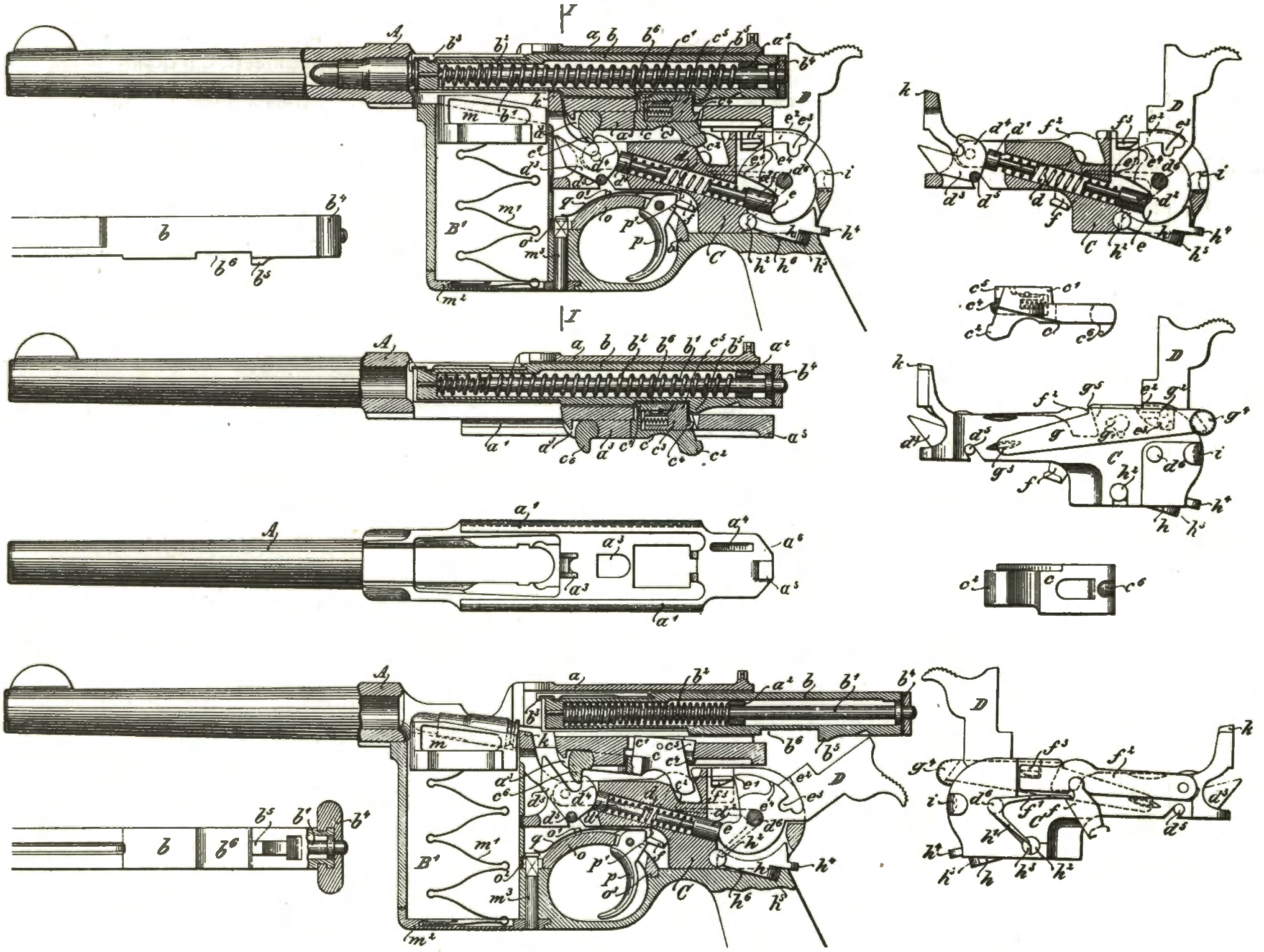


FIGURE 8–28. The German patent drawing for Mauser's C. 96 pistol. *(Korn)*

bolt and locking piece were modified to have two corresponding slots and lugs. This remained unchanged from 1896 to 1939. The locking piece was raised and lowered as it moved along an inclined plane milled into the frame of the pistol. The bolt and barrel extension recoiled together for a distance of about 2.5mm before the locking piece began to descend the ramp. As it dropped, the bolt was unlocked and permitted to continue its rearward travel separated from the barrel extension. The closing stroke of the mechanism was powered by the recoil spring. As the bolt and barrel extension closed, the locking piece was forced up into the locked position by the inclined plane. Mauser's team introduced a bolt hold-open device to keep the bolt back after the last shot had been fired from the pistol magazine. Common today, this was the first time that the hold-open feature was incorporated into the design of a self-loader.

By April, 1897, the design of the M/96 pistol had been stabilized.* The Pistolenbau (pistol department), under the direction of Josef Feederle, began to produce the first production model M/96 in April, assigning serial numbers starting with 360. With the exception of factory markings, the M/96 was produced without any major changes until 1900. Unhappily, the world did not rush to purchase the Mauser M/96 pistol. As table 8–1 indicates, the serial numbers on Mauser M/96 pistols are not an accurate indication of the number of handguns manufactured. The Mauser staff often skipped large serial number blocks. For example, they jumped from 1,000 + to 4,000 in the fall of 1897. Early in 1898 they reverted to where they had left off in the 1,000 range and proceeded to fill the gap up to 4,000. At other times they did not fill in the blank range of numbers. Military contracts were usually started with serial number 1. In the case of the M/96s delivered to the Italian navy in 1899, the serial numbers 14,999 to 19,999 in the commercial serial range were not used to offset the 5,000 pistols delivered to Italy.

By early 1902 about 26,000 commercial pieces had been sold and about 7,000 M/96s had been delivered under military contracts. Approximately 7,000 were still on hand at the factory ready for shipment. Since the factory maintained a large inventory of pistols, changes incorporated into later produc-

*No attempt will be made to describe all the minor variations in the M/96 pistols; information of this type can be found in the books listed at the end of this chapter.

TABLE 8-1 PRODUCTION VARIATIONS OF THE M/96 PISTOL

Date	*Serial Range*	*Remarks*
March 1895 to September 1896	0 to ca. 90	Prototype and preproduction engineering models
September 1896 to April 1897	ca. 90 to 360	So-called transitional preproduction models
April 1897 to end of 1899	ca. 360 to 14,999	First production model
January 1899 to end of 1899	1 to 5,000	Italian navy contract
		(Total through 1899 was 19,632)
1899 to mid-1902	ca. 20,000 to 35,000	Second production model; so-called slab-side with first-type improved firing pin
1902 to 1905	ca. 35,000 to 50,000	Third production model; second-type (2 lug) firing pin
1905 to 1910	ca. 60,000 to 90,000	Fourth production model; reversion to 1898-style milling on the frame
1910 to 1912	ca. 90,000 to 130,000	6-groove rifling adopted between 90,000 and 120,000
1912 to 1918	ca. 130,000 to 300,000	A new safety was introduced in 1915 at about serial number 280,000
1916 to 1918	1 to ca. 150,000	German army contract for 9mm Parabellum version
1922 to 1930	ca. 300,000 to 700,000 (or 800,000)	Production resumed in 1922
1930 to 1939	ca. 800,000 to 960,000	Model 1930 with universal safety
1931 to 1938	ca. 1 to 100,000	Model 712 Schnellfeuer

tion guns might result in one customer receiving an updated pistol at the same time as another customer received pistols from stock. This has led to considerable confusion for historians and much speculation by collectors. As far as the factory was concerned, changes were relatively unimportant. Mauser and other gunmakers were concerned with production and sales; the cosmetic appearance of the product was secondary.

Variations of the M/96

The following paragraphs outline the significant differences in the successive models of the M/96 pistol. Unless noted otherwise, all production models of the M/96 fired a more powerfully loaded version of the 7.65mm Borchardt cartridge, called the 7.63 × 25mm Mauser for identification purposes. This became one of the more popular European handgun cartridges of the first half of the twentieth century.

PISTOLS 1897 TO 1899 These pistols have been often incorrectly referred to as the Modell 1898 or the Modell 1899. Made in both six- and ten-shot versions, these handguns had horizontally serrated grip plates, a cone-type hammer, adjustable rear sight, and two horizontal cutouts machined into the ridges that formed the lower portion of the barrel extension. Serial numbers for these pistols ranged from about 5,000 to 14,999.

PISTOLS 1899 TO 1902 During this period, a number of modifications were introduced. The most noticeable change was the introduction of smooth sides on the lower frame (called the "slab-side" model by collectors). Cone-type hammers were phased out in favor of a hammer having a large head, flat sides, and a large circular hole. These changes were probably the result of an attempt to simplify the manufacture of the pistol through the elimination of nonessential machining. Serial numbers for these pistols started at about 20,000 and ascended to about 30,000 (the serial range 14,999 to 19,999 was not used to compensate for the Italian navy contract).

In 1902, the safety mechanism was redesigned so that the safety lever had to be pushed upward to lock the hammer mechanism. Pre-1902 safeties were applied by pressing them down. Mauser's people also experimented with another safety that combined the safety mechanism with the hammer itself. This *Galenkscherung*, joint-safety, (fig. 8–34 and 8–35) required both the safety and the hammer to be cocked in

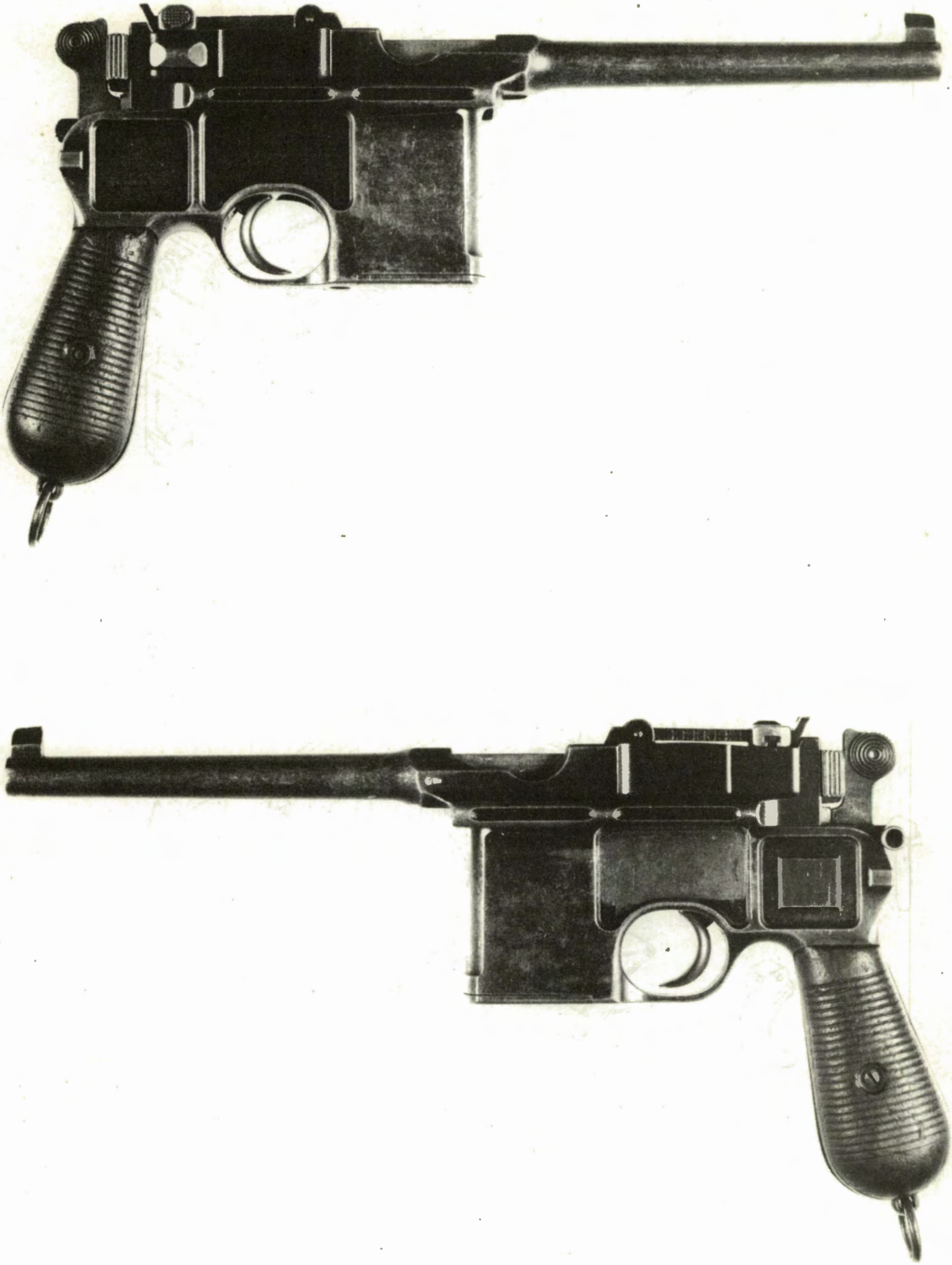


FIGURE 8–29. A typical conehammer Mauser M/96 pistol of the type manufactured during the years 1897 to 1899. This pistol had a 10-shot magazine. *(U. S. Army)*

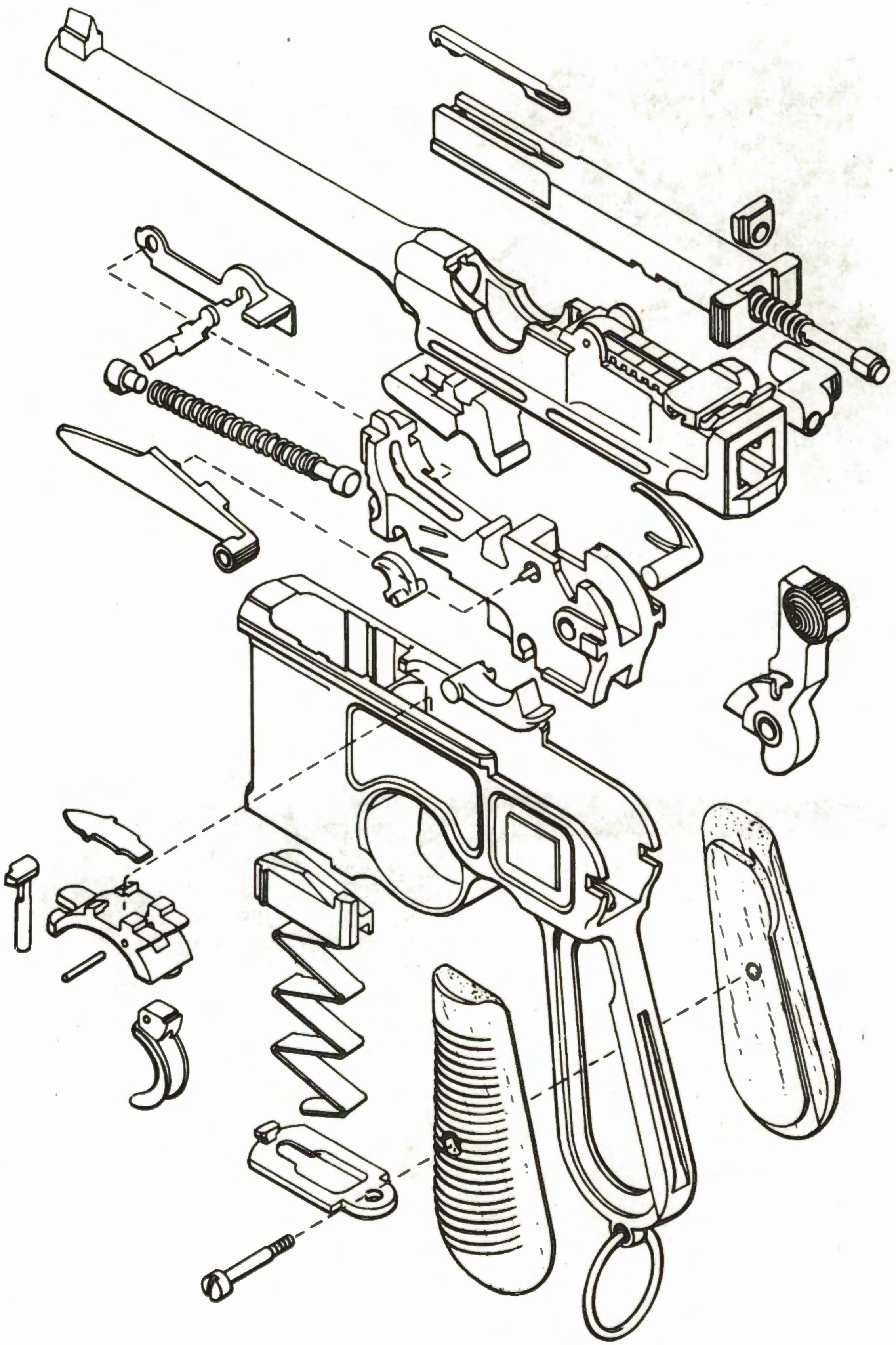


FIGURE 8–30. An exploded view of the cone-hammer-type M/96 pistol. Note especially the method of retaining the firing pin, and the long extractor. *(Bravermann)*

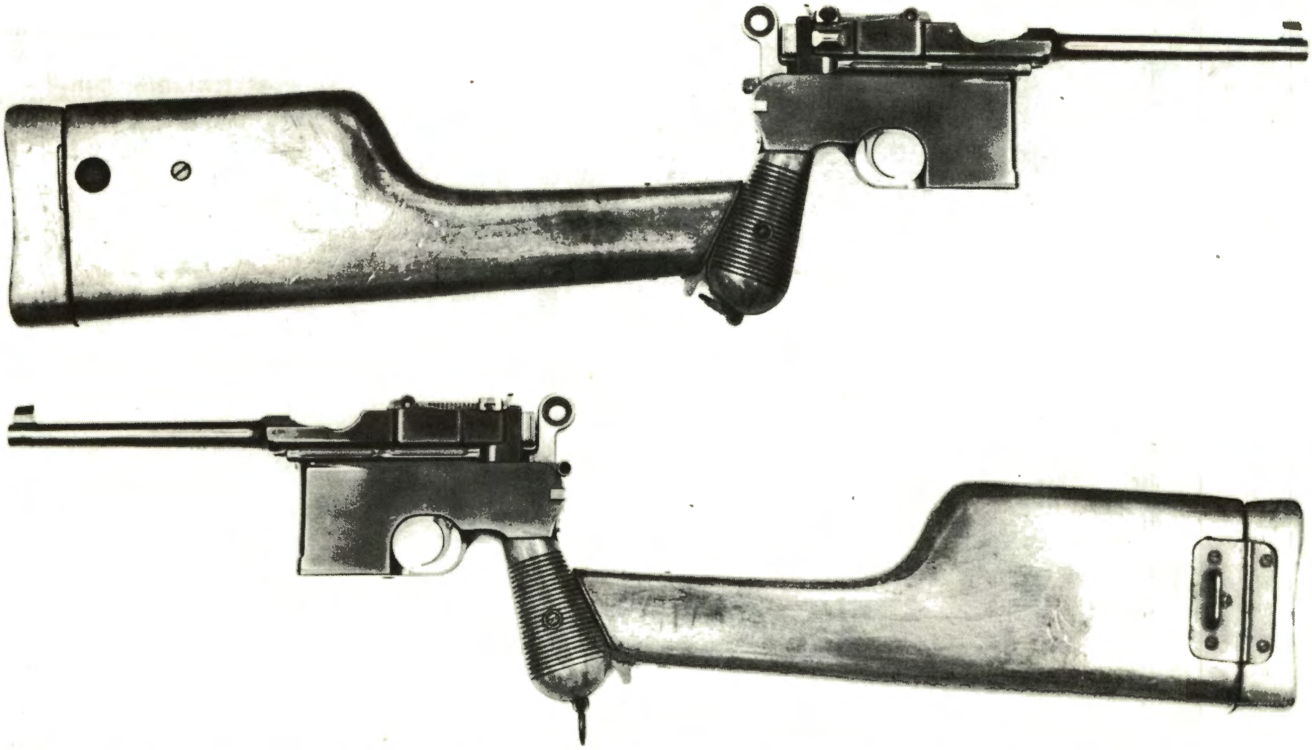


FIGURE 8–31. Two views of the M/96 pistol of the type manufactured between 1899 and 1902. Note the flat sides of the lower frame, and the large ring-type hammer. This was the type purchased by the Italian navy in 1899. *(Visser)*

FIGURE 8–32. Stock-holster for the M/96 pistol (fig. 8–31). Note the cleaning rod attached to the leather carrier. *(Visser)*

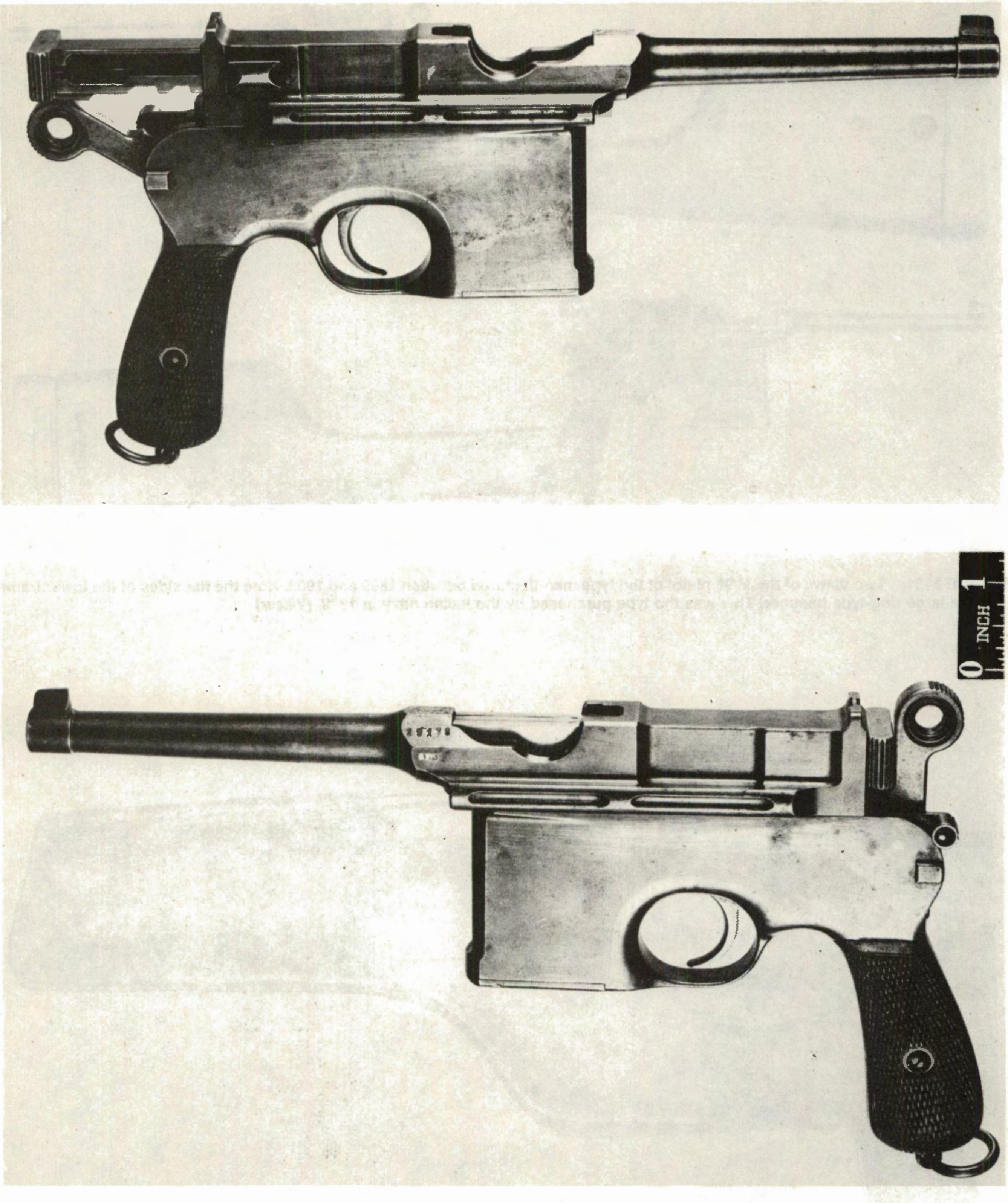


FIGURE 8–33. A M/96 pistol of the type made between 1899 and 1902 with the small-type grip. This pistol had serial number 29178. This type was sometimes called the officer's model. *(U. S. Army)*

FIGURE 8–34. The experimental M/1902 Mauser pistol with its special safety (joint safety). Unless the safety was also cocked, the hammer could not hit the firing pin. The pistol illustrated, serial number 29862, had a 100mm barrel, and was about 100 grams lighter than the standard 6-shot Mauser pistols. *(Krcma)*

D. R. P. 142359 vom 30. Mai 1902.

Hahnsicherung für Feuerwaffen.

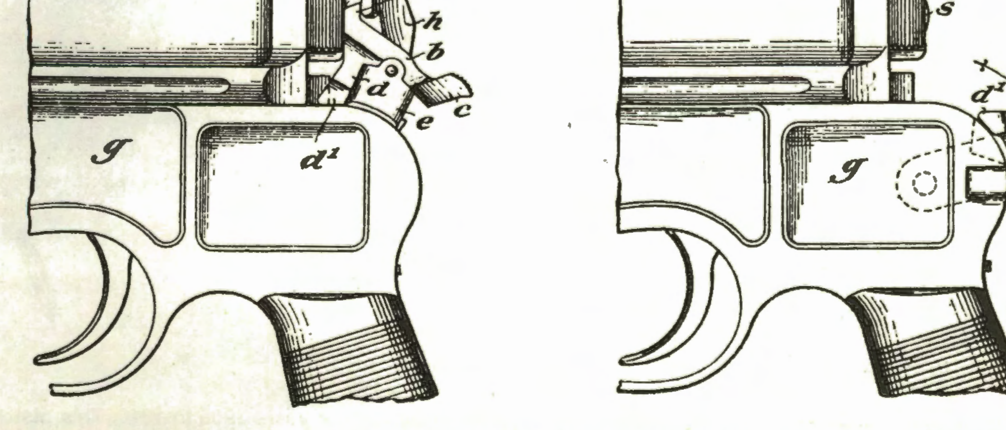
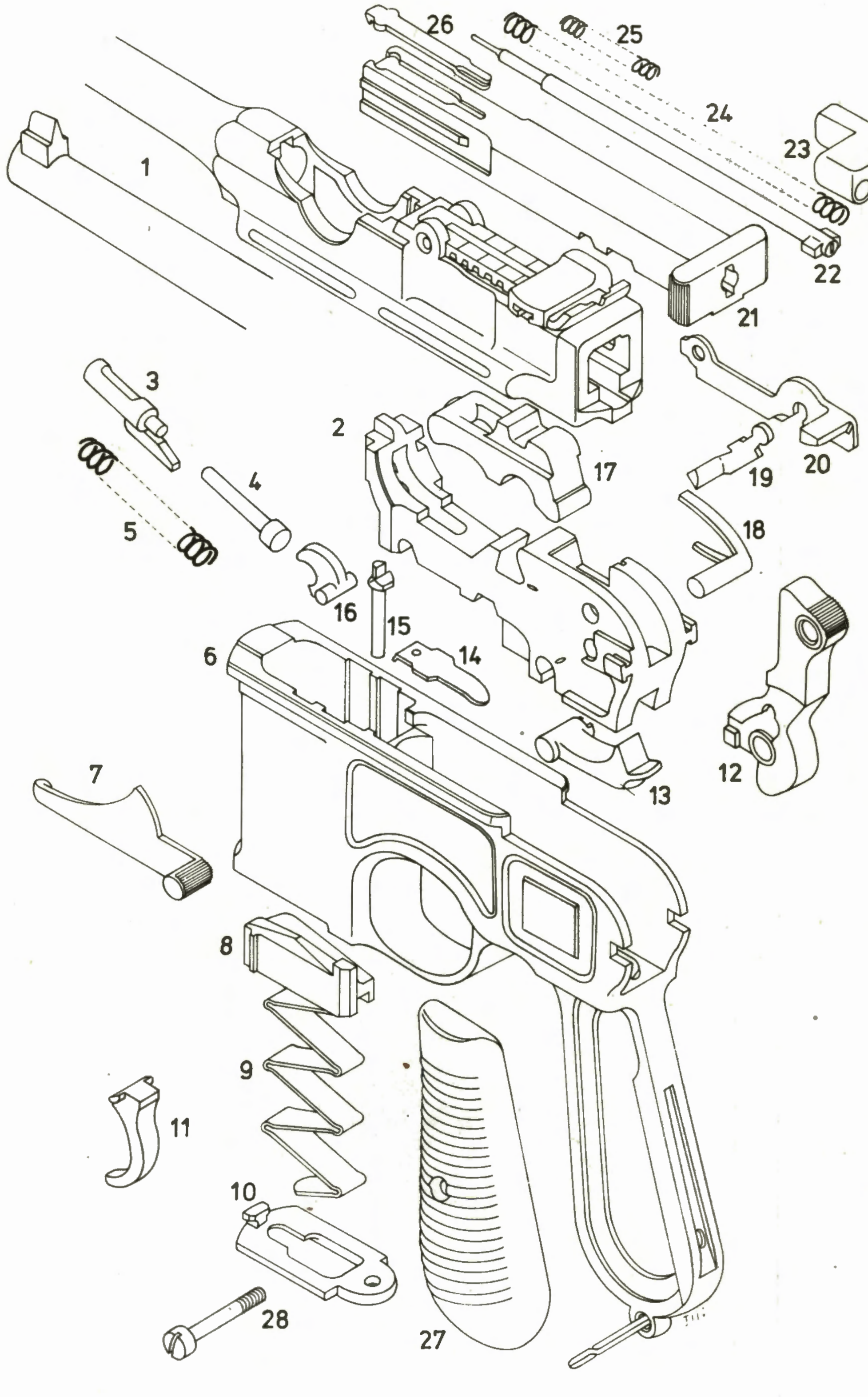


FIGURE 8–35. The patent drawing illustrates the *Gelenkscherung*, joint safety, of the M/1902 experimental Mauser pistol. *(Korn)*

FIGURE 8–36. A 6-shot commercial version of the Mauser M/96 of the type built during the years 1905 to 1910. This pistol, serial number 40220, logically belongs to an earlier era, but it was probably assembled during 1905 or 1906. *(Krcma)*



1. Barrel
2. Lock mechanism frame
3. Rocker plunger
4. Mainspring plunger
5. Mainspring
6. Frame
7. Safety
8. Magazine follower
9. Magazine spring
10. Magazine floor plate
11. Trigger
12. Hammer
13. Lock frame stop
14. Trigger spring
15. Magazine plunger
16. Rocker coupling
17. Bolt locking block
18. Sear spring and hammer pivot
19. Sear
20. Sear arm
21. Bolt
22. Firing pin
23. Bolt stop
24. Recoil spring
25. Firing pin spring
26. Extractor
27. Grip plate
28. Grip plate screw

FIGURE 8–37. An exploded view of the M/96 pistol (above serial number 35,000) with the second version of the improved firing pin. *(Jimbo)*

order to fire the handgun. When the safety mechanism was in the uncocked position, a metal projection was interposed between the firing pin and the striking surface of the hammer. An intriguing gadget, this safety elicited little enthusiasm from potential customers. Therefore, the Mauser people adopted the push-up safety described previously.

The pistol's firing pin was also modified in 1902. Early models had a sliding plate that held the firing pin in place. Again in what was probably a move to simplify manufacture, a new type of firing pin was introduced about serial number 20,800. These new pins had a small lug (at the end struck by the hammer) that was used to lock the pin in place. This same end had a slot so that a screwdriver could be inserted into the base of the pin. When the pin and its spring were dropped into the bolt, a quarter-turn locked it into place. At about serial number 35,000, a firing pin with two lugs was substituted for the one-lug pin to prevent the loss of the firing pin if one lug fractured.

PISTOLS 1905 to 1912 Paul Mauser built a new factory during the years from 1905 to 1907. In this same period, the firm also reverted to the milled side panels on the frame, following the pattern used before 1899. This change must have been made on the basis of aesthetic appeal because it had no functional purpose, and it increased the amount of machining required to finish the frame. Serial numbers ranged from about 60,000 to 90,000. There were four basic pistol types during this era: the 7.63mm pistol in 6- and 10-shot versions, and the 9 × 25mm pistol also in 6- and 10-shot versions. The 9mm Mauser cartridge had been introduced for the export market, notably for sales to South America. Only one hammer type was used: one with a smaller head. Somewhere between serial number 90,000 and 100,000, the factory switched over from 4-groove rifling to 6-groove rifling. Again this was a gradual process, because the factory continued to use up old rifling cutters. The changeover was complete by about serial number 120,000.

PISTOLS 1912 TO 1920 With the advent of the First World War, the factory ceased production of the 6-shot models and the 9mm models. Annual production levels rose to about 40,000 in 1915; in 1909 only 12,000 pistols had been manufactured. Between 1915 and 1916 there were few significant changes in the design of the M/96 pistol. However, an improved safety, *Neues Sicherung,* was introduced at about serial number 280,000. With this safety, the lever was pushed down to fire and pushed up for safe. Unlike the previous safety, the hammer had to be cocked before the safety could be applied. This new safety was identified by the *NS* engraved on either the hammer or the rear of the frame.

By 1916, the German army was beginning to experience a handgun shortage. In addition to the demands imposed by the maintenance of large forces in the field, the high rate of losses on the battlefields forced the army to seek supplementary supplies. Therefore, the Gewehrprufungs Komission (Rifle Proving Commission) placed a contract with Mauser for 150,000 M/96 pistols chambered to fire the 9 × 19mm Parabellum cartridge. The object of course was to maintain standardization of ammunition between the P 08 and the substitute handguns. These 9mm Parabellum M/96 pistols were manufactured between 1916 and 1918 and were numbered in a separate serial series 1 to 150,000. To provide for

FIGURE 8–38. The 9 × 19mm Parabellum M/96 pistol as used by the German army during World War I. Note the number 9 carved into the grip plate. *(Krcma)*

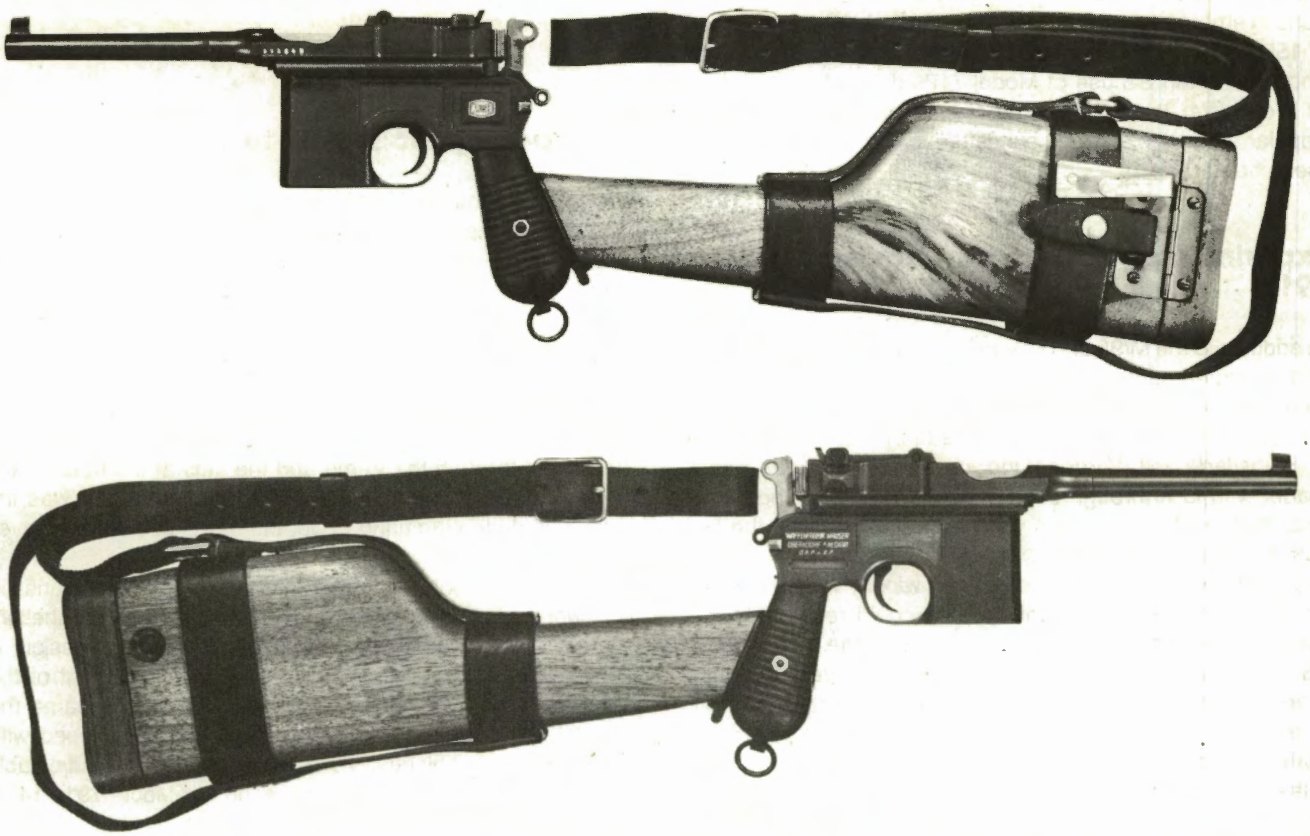


FIGURE 8–39. The M/1930 Mauser pistol serial number 891,648. This pistol had a 140.5mm barrel, was 294mm overall (641mm with stock), and weighed 1,188 grams (1,906 grams with stock). The 10-shot magazine was loaded with a stripper clip. The rifling was 6 right. *(Krcma)*

the quick identification of these 9mm Parabellum models, a numeral *9* was carved into the grip plates, and then it was painted red. Serial numbers for the 7.63mm pistols rose to about 300,000 by the end of the war.

PISTOLS 1920 TO 1939 As noted in chapter 4, the Treaty of Versailles prohibited the manufacture of certain classes of military equipment. Military handguns were included in this ban. In the years immediately following the war, Mauser concentrated on refurbishing their 9mm Parabellum pistols for issue to police and military forces authorized under the peace treaty. On 30 May 1922, as part of a postwar reorganization, the Waffenfabrik Mauser A–G became the Mauser Werke A–G. It was about this same date that commercial production of the M/96 was resumed. During the 1920s the major market for Mauser pistols was Asia, with the bulk being shipped to China through various Japanese trading houses. These sales began to drop off in 1929 as deliveries of Spanish-made copies of the M/96 began to be sold into these same markets (see chapter 13). By 1929 the serial numbers for M/96 pistols stood at about 700,000.

The year 1930 saw yet another type of safety introduced, and the again-modified M/96 pistol was renamed the *Model 1930 with Universal Safety*. This safety mechanism permitted the hammer to be dropped on the firing pin without detonation of the cartridge in the chamber. These pistols were marked *Waffenfabrik Mauser Oberndorf A. Neckar D. R. P. u. A. P.* (German and other patents). This remained the basic model produced until the manufacture of the Mauser pistol was terminated in 1939. One final type of M/96-derived handgun should be mentioned: the full automatic model—Schnellfeuer. Designated the M/1932 or the Modell 712, this pistol had a selector switch that permitted single-shot fire (semiautomatic) when the switch was pointing to *N* and repetive fire (automatic) when the switch was pointing to *R*.

There were two types of fire control mechanisms for the Model 712 Schnellfeuer. The earliest was created by Josef Nickl and unspecified difficulties were reported to have been experienced with this type. As a consequence it was only produced in 1930 and 1931. In 1932, Mauser introduced a slightly different model based on a design created by Karl Westinger (German patent dated 13 April 1932; U. S. patent 2,058,746 of 16 February 1936). The most obvious difference between the Nickl and Westinger selective fire mechanism was the fire-selector lever. Westinger's fire control mechanism worked without any problems, and was used in nearly 100,000 Schnellfeuers built between 1932 and 1938. These handguns had their own serial series starting with the number 1.

When one adds up all of the serial numbers for the Model 96 pistols and then subtracts the exceptions, the total production would appear to be about 960,000. If the 100,000 Schnellfeuers are included the total rises to more than a million. The large production of the Mauser M/96, M/1930,

and M/712 pistols was largely due to the popularity of the pistol overseas. The German military only used these handguns in emergencies: for example, the World War I purchase of 150,000; the postwar use of reworked pistols by the police; and the Waffen SS use of Model 712s during the early part of World War II. In China, the Mauser pistol became very popular as a pistol-carbine substitute for hard to obtain rifles (see chapter 13).

Experimental Mauser Self-loaders, 1906 to 1914

In addition to the M/96 and its variants, the men at the Mauser factory experimented with several other designs for military side arms. One of the most interesting was the Model 1906/08 pistol. The locking system in German was described as a *Selbstlade mit Verriegelung durch Stützflappen*—self-loader with lock through short flaps. In operation, the barrel and the breech mechanism were locked together at the beginning of the recoil stroke. As the assembly moved to the rear, the two steel flaps (also called wings) were cammed from behind the bolt so that the bolt could recoil between them. This locking system was also used in the Model 1906/08 rifle. Only a few Model 1960/08 pistols were built—less than 100—and it is not clear if Mauser made these simply to try out the operating mechanism or if he seriously contemplated introducing this design to compete with his M/96 pistol. Other interesting design features in the Model 1906/08 pistol included the bolt hold-open mechanism, which was released when a loaded magazine was inserted into the pistol, and the removable magazine itself.

Blowback pistols, 1907 to 1914.

Beginning about 1907, Mauser's people began to work on the development of blowback pistols. The first in this series was a 9mm Parabellum caliber design designated the Model 1909. Even though this pistol was intended to be used with a less powerful version of the 9mm Parabellum cartridge (lighter projectile, smaller propellant charge), it was still an ambitious attempt. The Model 1909 embodied a fixed barrel, an open top slide, and a striker firing pin instead of a hammer struck firing pin. The barrel was locked to the frame by a pin that went through the frame and the lugs at the muzzle and breech ends of the barrel (fig. 8–45). Although it was immovable during the firing cycle, the barrel could be removed for cleaning.

This initial venture into the field of blowback handguns did not work out. Even with a reduced load, the 9mm Parabellum cartridge was too powerful for a simple blowback design. A friction brake was developed to slow the movement of the recoiling parts, and this modified Model 1909 became the Model 1912. Most Model 1912 pistols were equipped with shoulder stock-holsters. When equipped with an adjustable rear sight, this 9mm pistol was called the Model 1912/14. A

FIGURE 8–40. The 7.63mm Mauser Model 712 Schnellfeuer selective-fire pistol with 20-shot detachable magazine. ***(Krcma)***

FIGURE 8–41. The second model of the Mauser Model 712 Schnellfeuer embodying the Westinger fire control mechanism was built from 1932 to 1938. *(U. S. Army)*

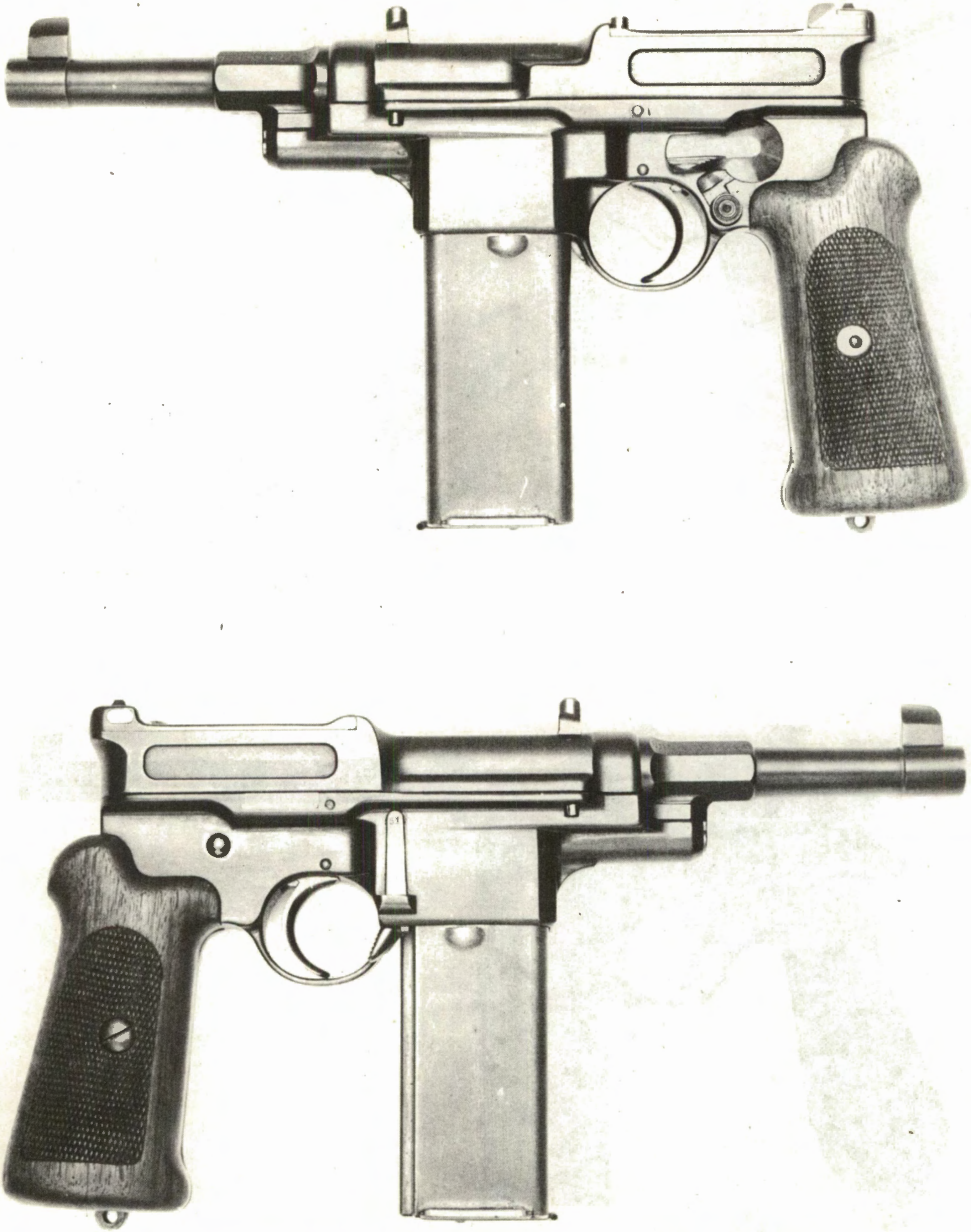
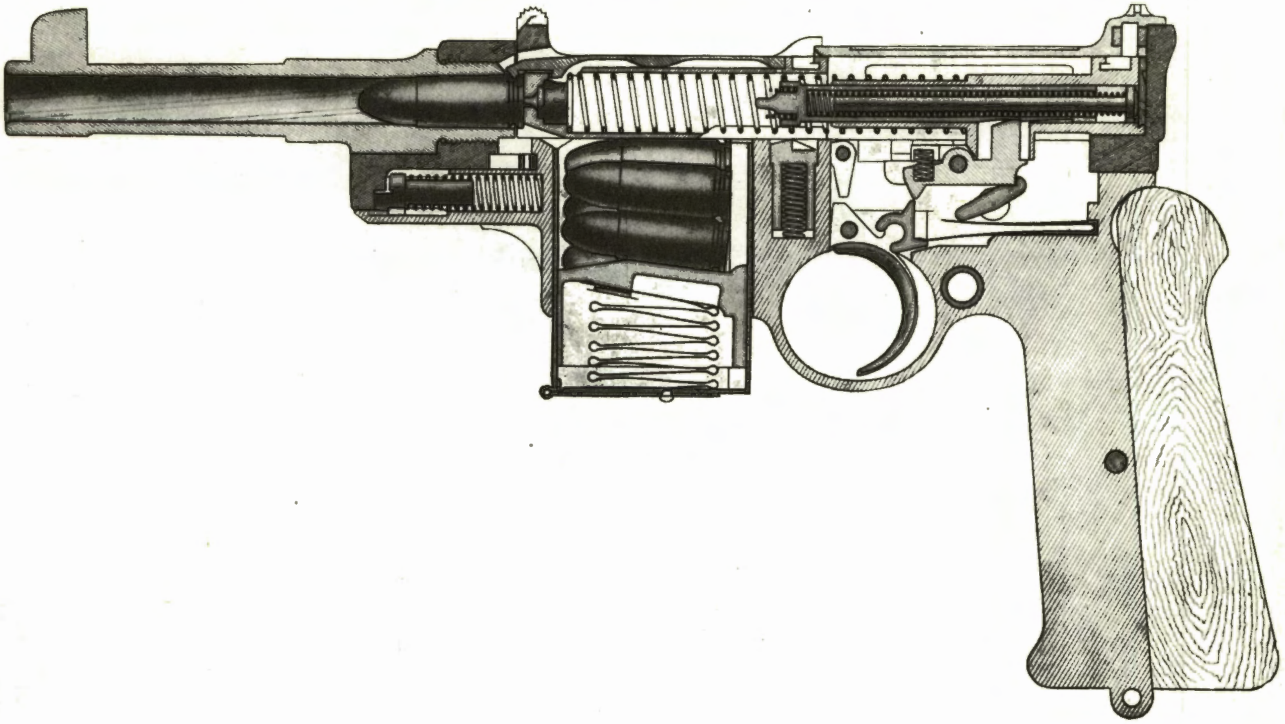


FIGURE 8–42. The 9 × 25mm Mauser 1906/08 experimental self-loading pistol. This prototype, serial number 51, had a 100mm barrel and was 240mm overall. It had a 20-shot magazine, but some 10-shot magazines were also fabricated. *(Visser)*

Selbstlader mit Verriegelung durch Stützklappen. Rückstoßladepistole 06/08.

Vertikaler Längsschnitt der Pistole, geschlossen und verriegelt, vor dem Abfeuern.



Oberansicht der Pistole, geschlossen und verriegelt, Deckel abgenommen.

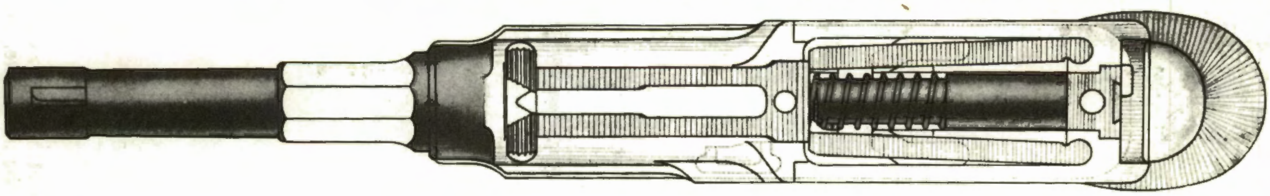


FIGURE 8–43. Section views of the Mauser M/1906/08 pistol. The top view shows the striker cocked and ready to fire. The bottom view shows the locking mechanism with the steel flaps closed behind the bolt. ***(Korn)***

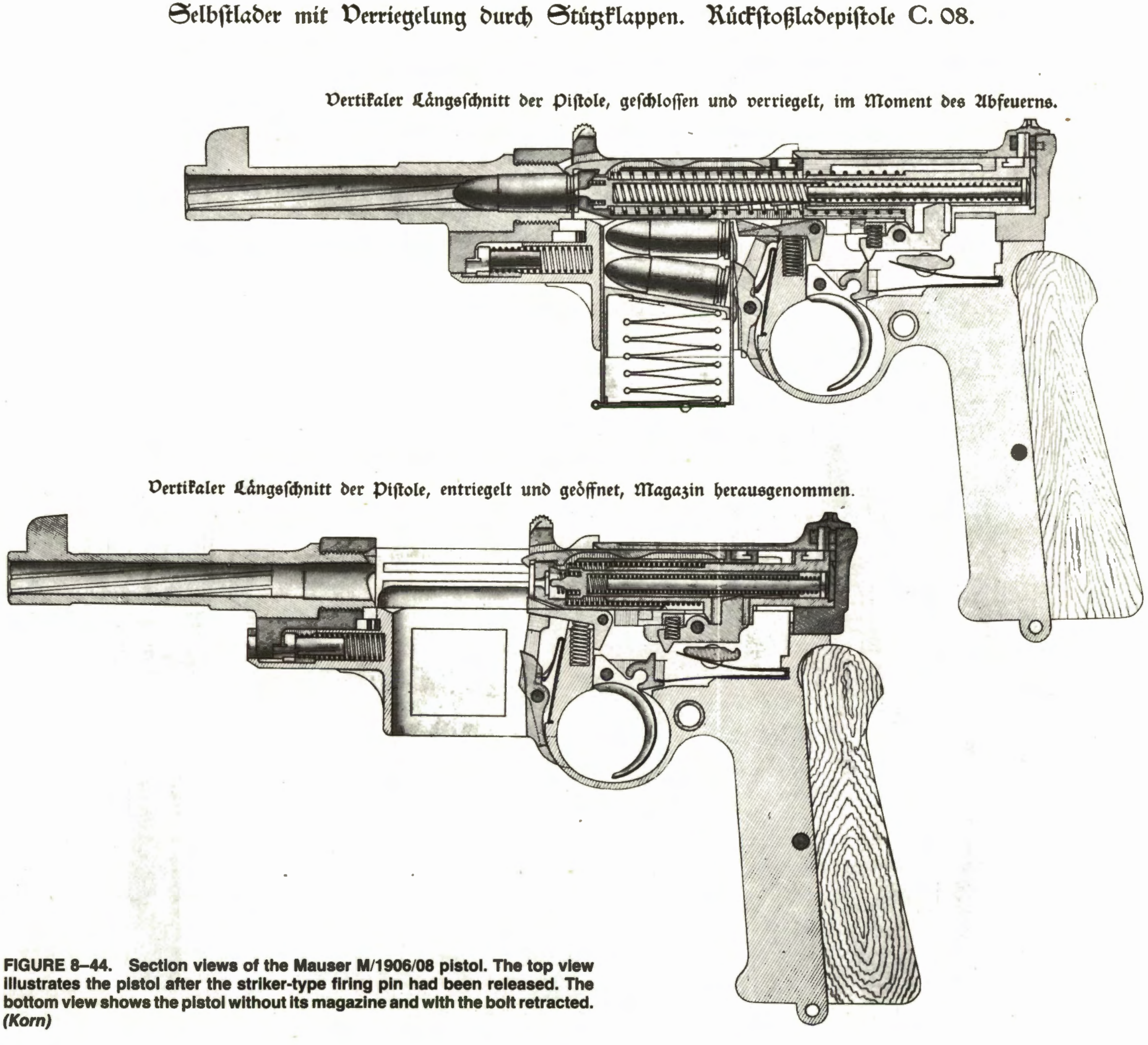


FIGURE 8–44. Section views of the Mauser M/1906/08 pistol. The top view illustrates the pistol after the striker-type firing pin had been released. The bottom view shows the pistol without its magazine and with the bolt retracted. *(Korn)*

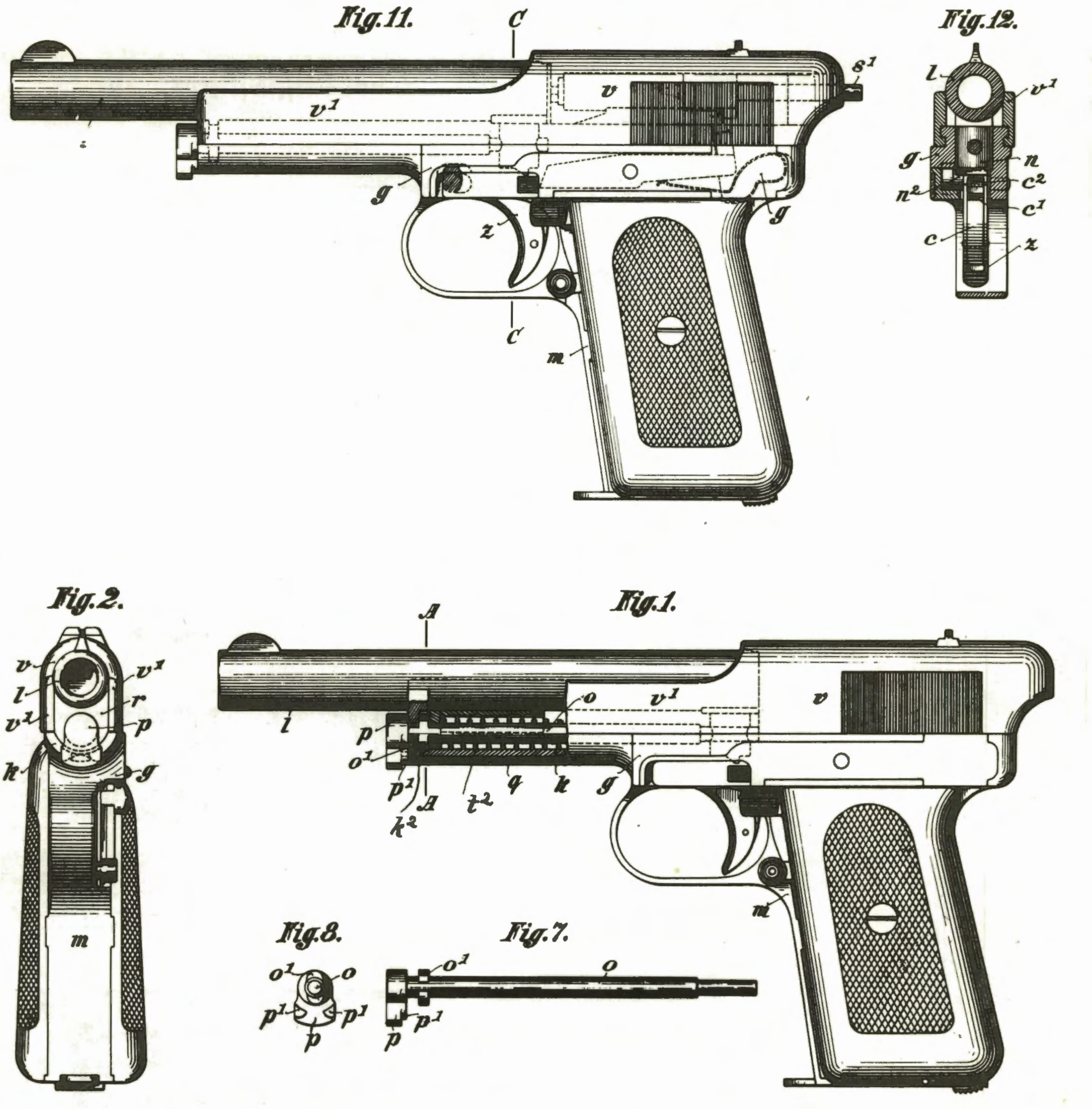
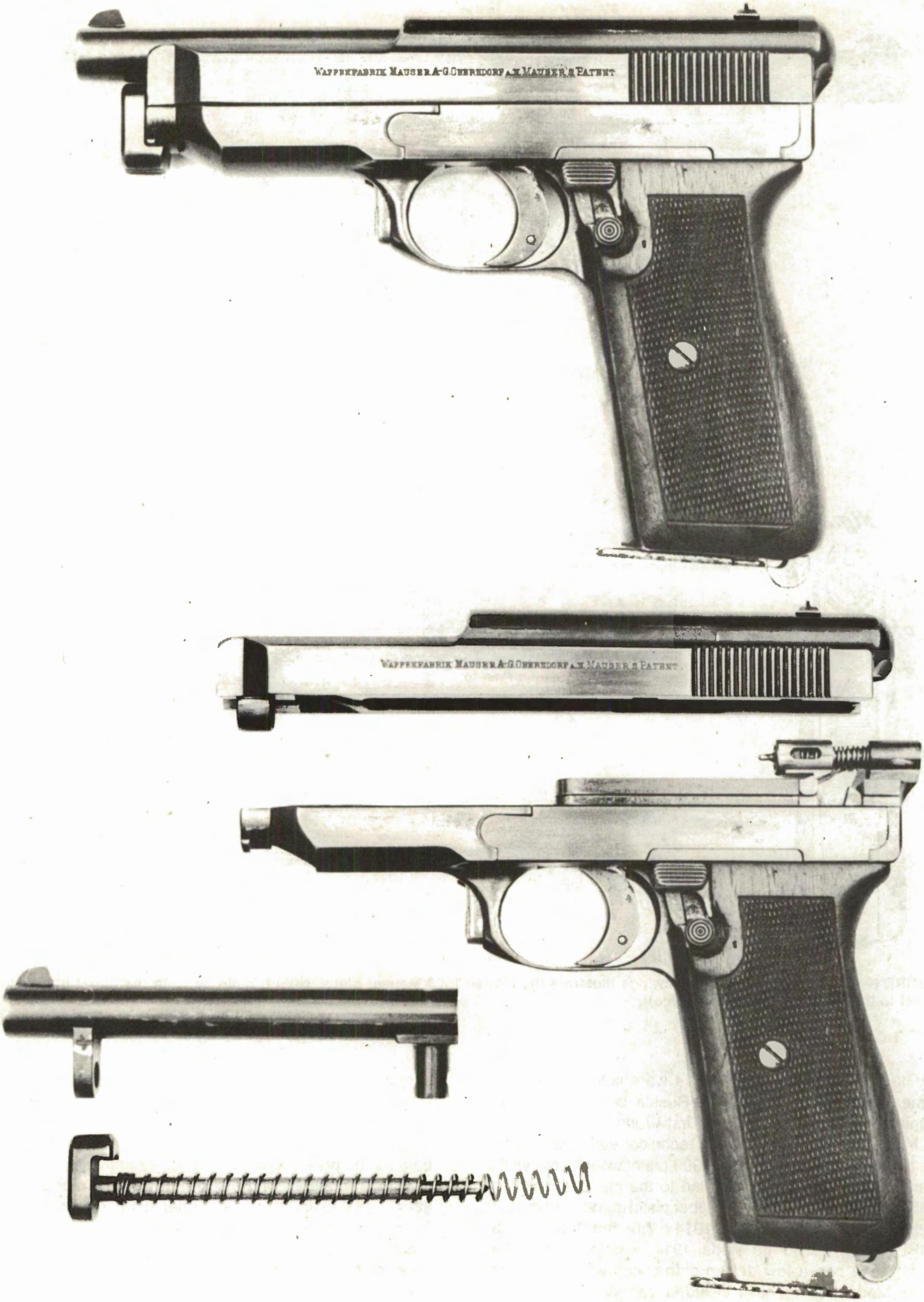
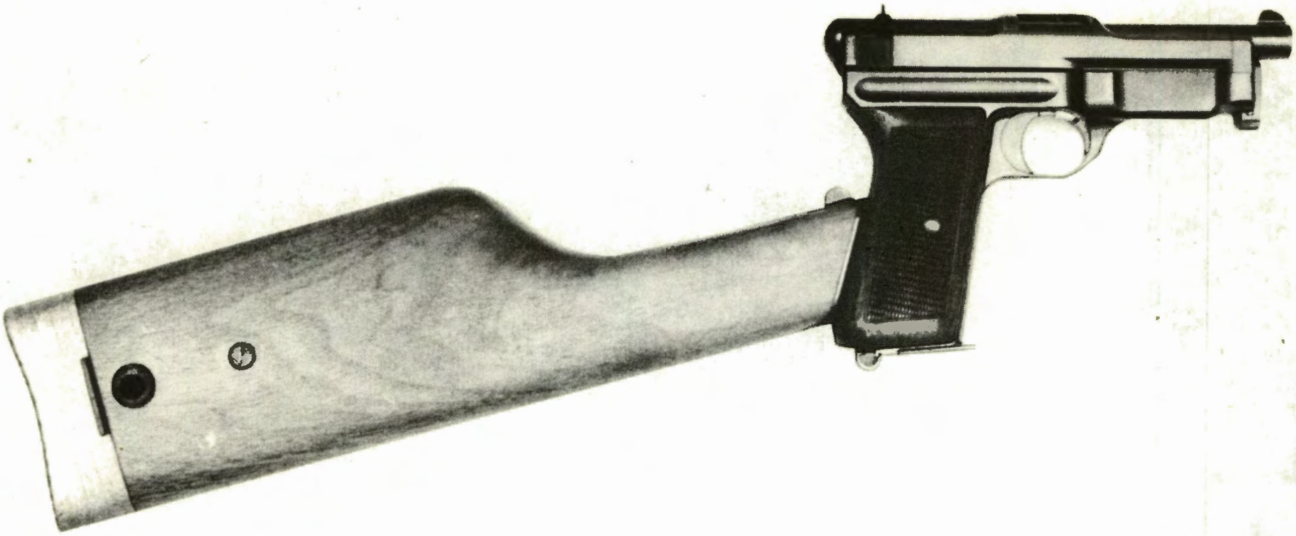


FIGURE 8–45. These two patent drawings illustrate the Modell 1909 Mauser pistol. Note the pin beneath the barrel that locks the barrel to the frame. *(U. S. Patent Office)*

few hundred of the Model 1912/14 were sold to Brazil, and some may have been shipped to Russia, but production was terminated with the start of the First World War.

Meanwhile, Mauser and his technical staff realized that the basic design of the Model 1909 pistol would work well in a small caliber cartridge. This led to the introduction of the 6.35mm Browning (.25 ACP) caliber pistol introduced in 1910, and called the Model 1910. In 1914 a 7.65mm Browning (.32 ACP) version, called the Model 1914, was introduced. The Model 1914 had a few design differences when compared to the Model 1910. These included the addition of a small spring catch to retain the barrel pin, the changed shape of the plate covering the lock mechanism, and a few other cosmetic differences. These alterations were also incorporated into post-1913 production of the 6.35mm pistols. Serial numbers for the pre-1913 6.35mm pistols ranged from 1 to about 61,000. The serial numbers for the 7.65mm models ranged from 61,000 to about 100,000. After 1913, the serial numbers for the 6.35mm pistols ranged from about 100,000 to 200,000. From 200,000 to 640,000 (reached in 1939), the serial numbers for the 6.35mm series and the 7.65mm series were intermingled.


WAFFENFABRIK MAUSER A-G OBERNDORF A.N. MAUSER'S PATENT
WAFFENFABRIK MAUSER A-G OBERNDORF A.N. MAUSER'S PATENT



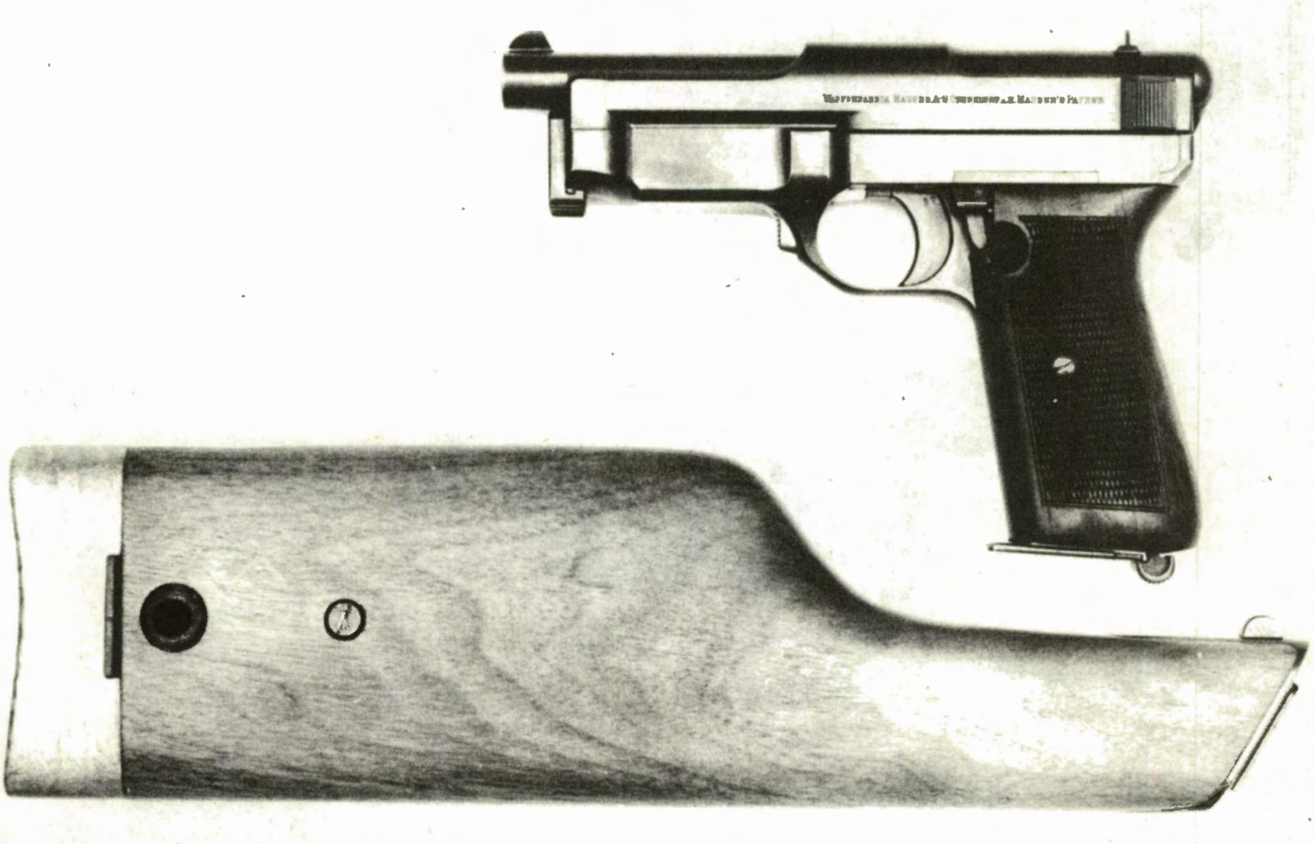


FIGURE 8–47. Another 9mm Parabellum Mauser experimental pistol of the pre-1914 period. This one was assigned serial number 129. *(Visser)*

←

FIGURE 8–46. A 9mm Parabellum prototype Model 1912 Mauser self-loading pistol. This one, serial number 4, had a 110mm barrel and was 185mm overall. *(Visser)*

FIGURE 8–48. A 9mm Parabellum Mauser pistol Model 1912/14. This is the type believed to have been manufactured for Brazil. This pistol, serial number 147, had a 110mm barrel, was 182.5mm overall, and weighed 1,004 grams. The magazine held 9 shots, and the rifling was 6 right. *(Krcma)*

In addition to these pistols, Mauser introduced the *Westentaschenpistole* (WTP), vest pocket pistol, in 1918. A second version of the WTP was introduced in 1936 and 1937, but production was terminated in 1939. A total of 90,000 to 100,000 WTPs of both models were produced between 1922 and 1939.

In 1934, the Model 1912/14 was given a facelift. The basic change was the substitution of a molded, wrap-around grip plate that produced a more streamlined look. Still, the Mauser engineers could not ignore the fact that their pre-World War I design was losing ground to the more modern looking Walther PP and PPK models. Therefore the designers at Oberndorf decided to develop something more modern, both in external appearance and in mechanical design. The result was the HS series of pistols. *Hahn Selbstspanner* meant self-cocking hammer or double-action. The first pistol in this series was the *HSa* introduced in 1937. The one actually manufactured was the third model, or *HSc.* Alex Seidel was the head of the design team that perfected this pistol.* Production of this 7.65mm Browning caliber pistol began about 1940, and by the end of the war about 250,000 had been manufactured. Serial numbers ranged from 700,000 to about 950,000. The HSc was issued to Wehrmacht and Luftwaffe personnel and nearly all have the Waffenamt acceptance stamps. Following the war, the French government had Mauser build another 20,000 or so HSc pistols for their troops.

As with the Model 1912/14 before it, the HSc had a fixed barrel. In the HSc the barrel was machined in such a way that the breech end was held immovable in the frame when the barrel was surrounded by the slide. When the slide was removed (by pulling the slide to the rear, lifting, and then allowing it to go forward), the barrel could be lifted out of its bed in the frame. The slide fully enclosed the barrel, and the safety mechanism was mounted on the rear left side of the slide. While the hammer can be cocked in a single-action fashion, the HSc was intended primarily to be used as a double-action pistol. The safety blocks the movement of the firing pin, and prevents the cocking of the hammer. Unlike the Model 1912/14 which had a cocked striker assembly when loaded, the HSc could be carried safely with a loaded chamber even with the safety off. With the safety applied it was nearly impossible to fire this pistol accidentally. Three British patents covered this pistol: one for the safety (460,859, 1935), one for the double action lock (461,961, 1935) and one for the barrel retaining system (465,041, 1935).

Other experimental Mauser pistols

An Austrian by birth, Josef Nickl went to work at the Mauser factory sometime before the start of the First World War. He appeared to have been trained as an engineer. During the war, about 1916, Nickl developed a rotating barrel, locked-breech mechanism that he adapted to the frame of the Model 1912/14 pistol. While just a few of these pistols were built at Mauser, his design was later licensed from Mauser by the Czechoslovakian government. His design appeared in the Czech vz.22 and vz.24 pistols (see chapter 14). Nickl was also the creator of the first fire control mechanism used in in the selective fire Modell 712 Schnellfeuer version of the M/96 (U.S. patent application 575,618 of 17 November 1931). In the 1930s, a 9mm Parabellum version of Nickl's rotating barrel pistol was tested by the German military but it was not adopted. Josef Nickl died 26 March 1946.

Information regarding experimental Mauser pistols developed during the Second World War is presented in chapter 18. Parabellum manufacture at Mauser is discussed in chapter 4, and P 38 production is discussed at the end of this chapter.

WALTHER PISTOLS

The Carl Walther Waffenfabrik was located in the Thuringian town of Zella-Mehlis. It was one of several prominent metalworking centers in Thuringia (Erfurt and Suhl were two of the others). Metalworking in Zella-Mehlis began in the mid-1400s, and the gunsmith's guild was created in 1593. Carl Walther was born here in 1860. At the age of 26, he set up a workshop in Zella-Mehlis to make sporting arms. Until the end of the century this was a very small-scale operation, consisting of Walther and one or two apprentices. By the early years of the twentieth century, he was being assisted by his sons Fritz, Georg, and Erich. In 1907, Fritz designed a 6.35mm blowback pistol. He had been inspired by the incredible popularity of the 6.35mm FN-Browning pocket self-loader. Carl and his sons saw the opportunity to make such a pistol and sell it in the German market. This little handgun, an original design, was offered for sale in 1908.

The Carl Walther Waffenfabrik grew slowly but steadily. Soon he had a work force of fifteen and was able to produce his handguns in respectable quantities. The Walther's introduced their second 6.35mm pistol, the Modell 2, less than a year after the first pistol, retroactively called the Modell 1. The slide of the Modell 1 was cut away exposing the forward end of the barrel, while in the Modell 2 the slide completely enclosed the barrel. In the first model, the recoil spring was housed below the barrel; in the Modell 2 the recoil spring surrounded the barrel and was held in place by a removable barrel bushing. The Modell 2 had a hammer-type firing mechanism; the Modell 1 had a striker type. In many ways, the Modell 2 was a more sophisticated design. It had a loaded chamber indicator in which the rear sight was elevated to the proper sighting level when the chamber was loaded. A well-made product, the Modell 2 Walther pocket pistol was a very popular handgun in Germany before World War I.

Modell 3

Walther introduced their first 7.65mm pistol in 1910. This handgun was essentially a scaled-up version of the Modell 2, with the exception of the change to the barrel bushing. The knurled bushing was replaced by a cap that extended over

*In the postwar period, Alex Seidel was one of the founders of Heckler & Koch GmbH of Oberndorf. A new version of the HSc would be manufactured as the HK 4 pistol (see chapter 18).

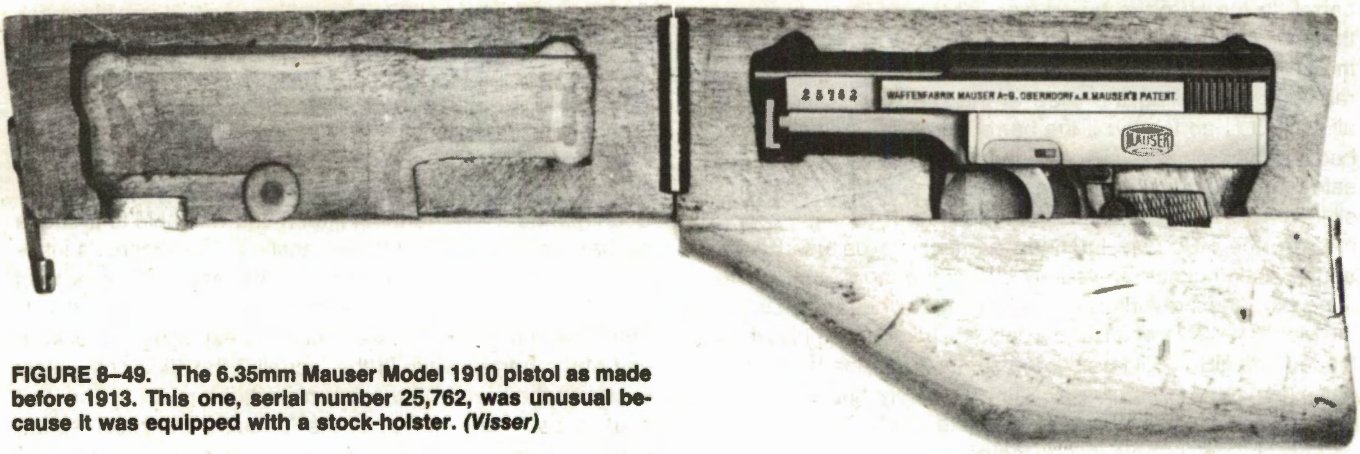


FIGURE 8–49. The 6.35mm Mauser Model 1910 pistol as made before 1913. This one, serial number 25,762, was unusual because it was equipped with a stock-holster. *(Visser)*

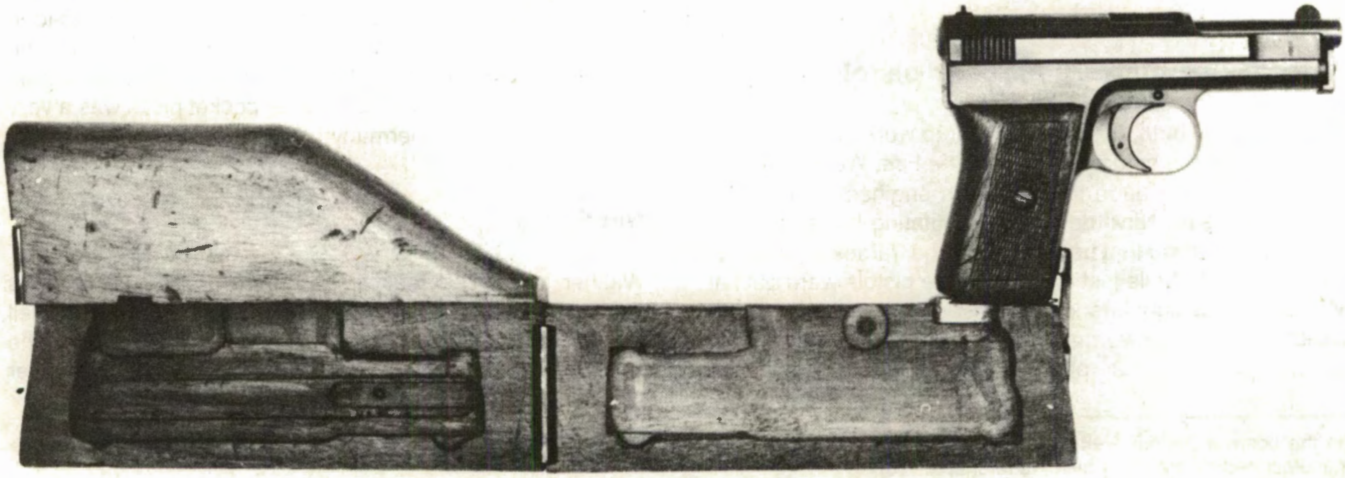
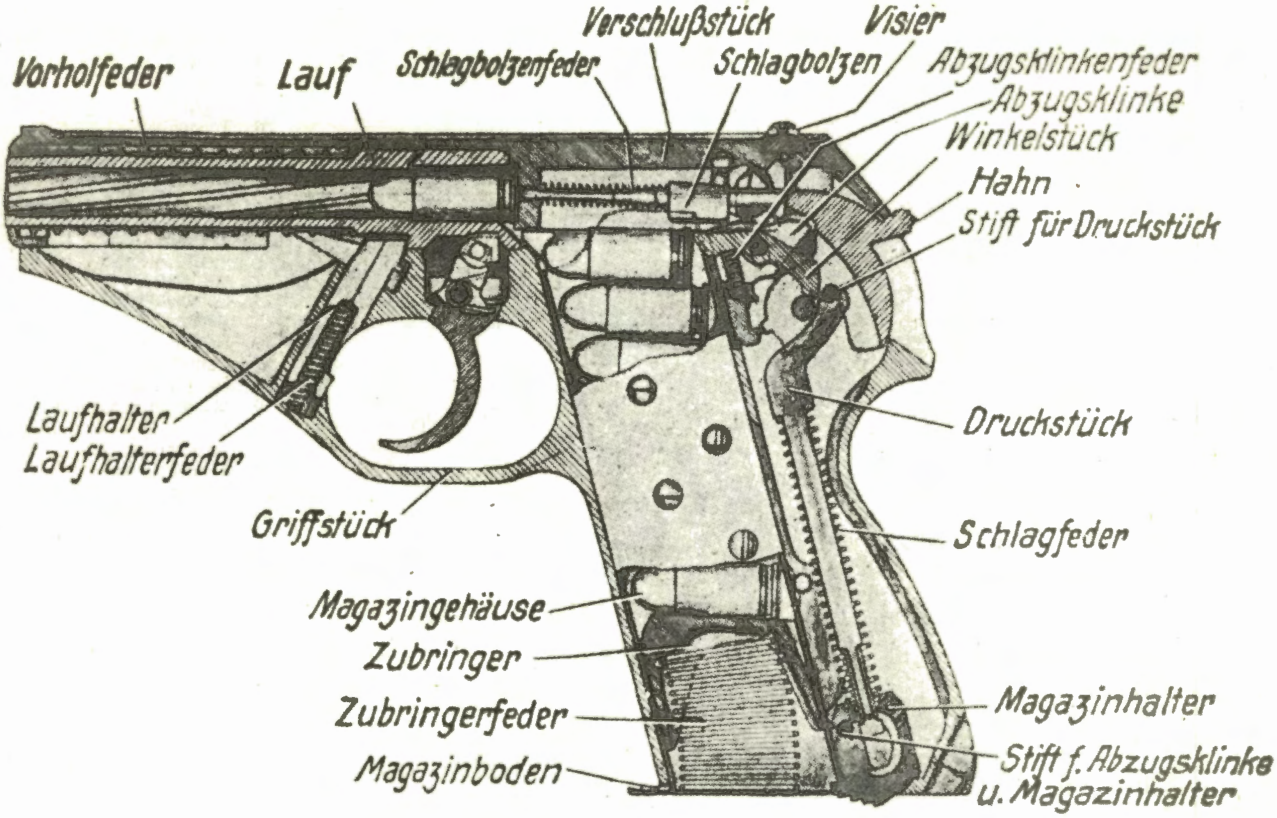


FIGURE 8–50. The 6.35mm Model 1910/34 Mauser pistol serial number 421,998. Note the recontoured grip and plastic wrap-around grip. *(Visser)*

FIGURE 8–51. The Mauser 7.65mm Model 1914 pistol. This was a commercial model with special inlaid grips. *(Krcma)*

FIGURE 8–52. A 7.65mm Model 1934 Mauser pistol. This wooden grip model, serial number 545,762, was purchased by the German navy before World War II. *(Visser)*

FIGURE 8–53. A standard version of the 7.65mm Mauser HSc pistol. ***(Tokoi)***



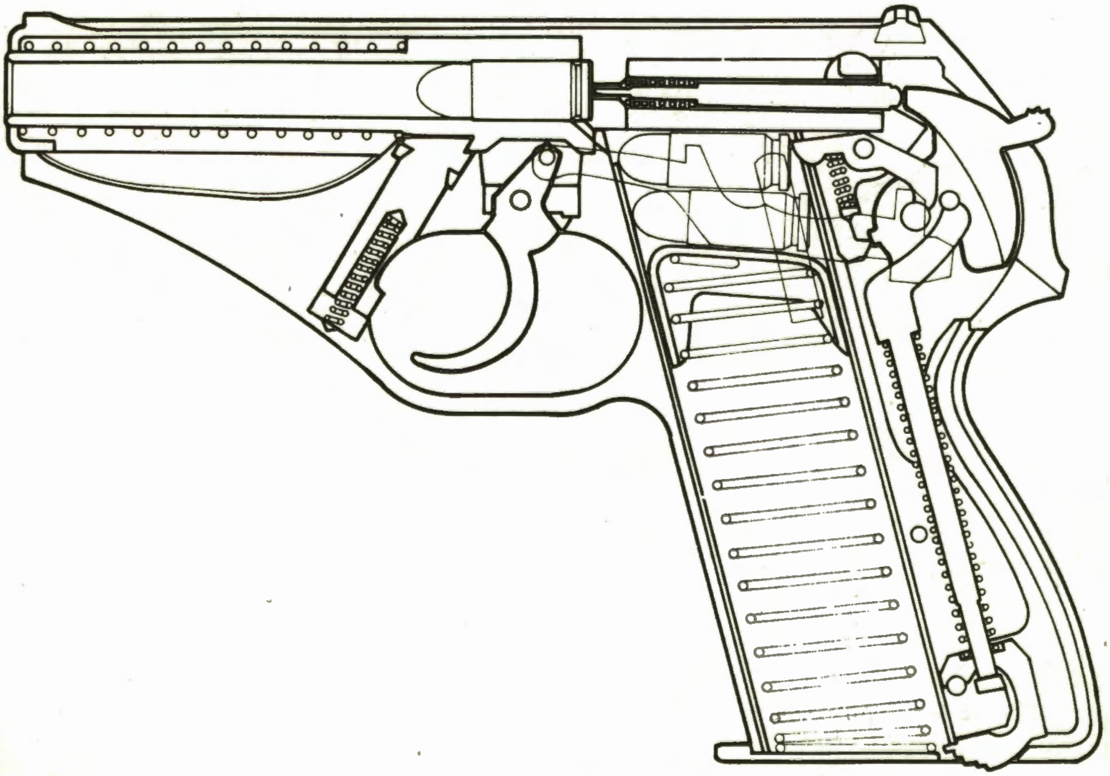
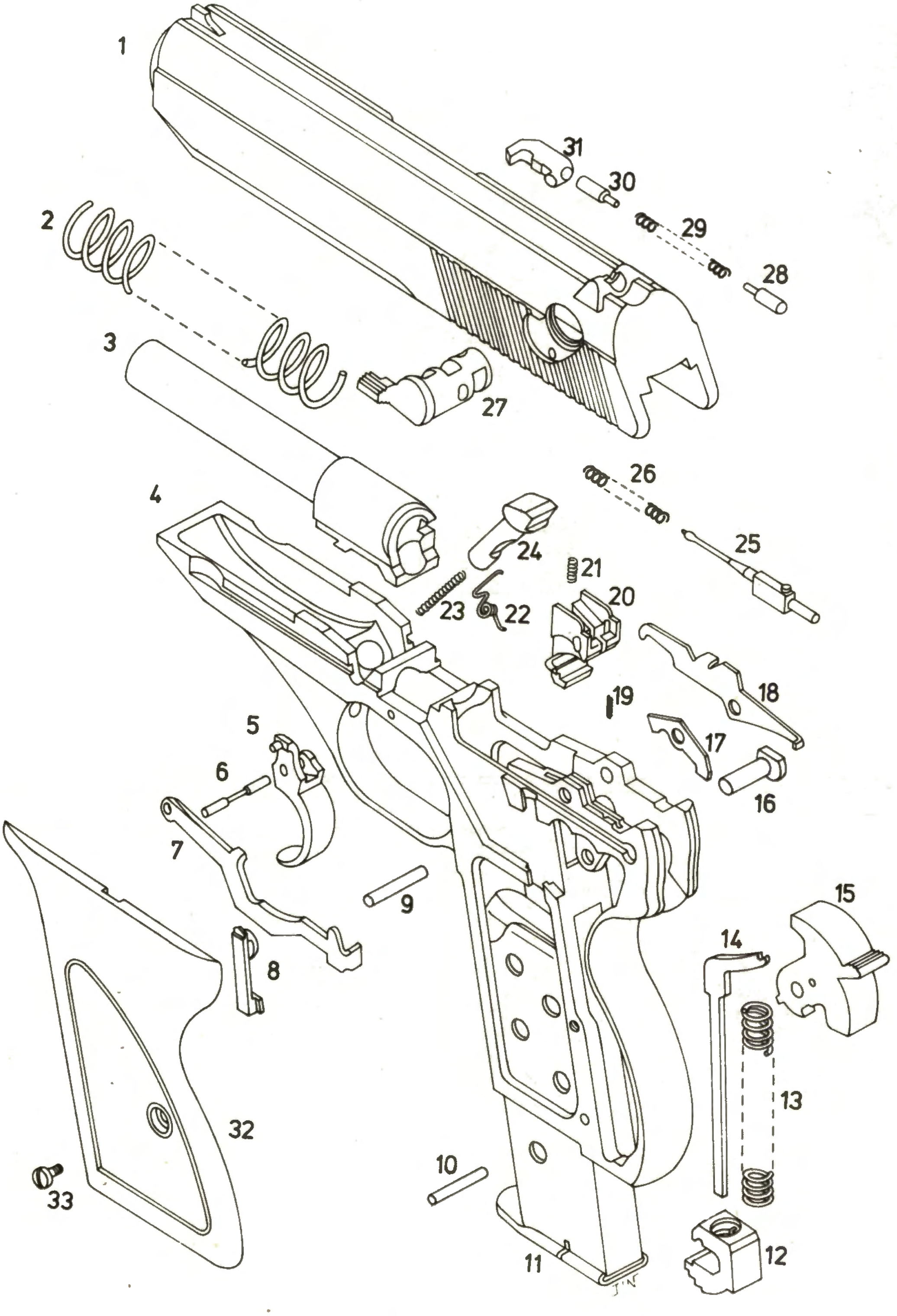


FIGURE 8–54. Section views of the Mauser HSc pistol. *(Tokoi and Jimbo)*



1. Slide
2. Recoil spring
3. Barrel
4. Frame
5. Trigger
6. Trigger pin
7. Trigger bar
8. Disconnector
9. Sear hinge pin
10. Magazine catch pin
11. Magazine
12. Magazine catch
13. Hammer spring
14. Hammer strut
15. Hammer
16. Hammer hinge pin
17. Cartridge feed cam
18. Magazine disconnect safety
19. Magazine disconnector spring
20. Sear
21. Sear spring
22. Trigger spring
23. Takedown latch spring
24. Takedown latch
25. Firing pin
26. Firing pin spring
27. Safety
28. Safety plunger
29. Extractor spring
30. Extractor plunger
31. Extractor
32. Grip plate
33. Grip plate screw

FIGURE 8–55. An exploded view of the Mauser HSc. *(Jimbo)*

FIGURE 8–56. Carl Walther the founder of the Carl Walther Waffenfabrik of Zella-Mehlis, Germany. *(Chinn)*

FIGURE 8–57. The Walther handgun line for the years 1908 to 1938. *(Walther)*

FIGURE 8–58. The first Walther pistol, 6.35mm Model 1, introduced in 1908. This example was given serial number 10,023. *(Krcma)*

FIGURE 8–59. The Walther 7.65mm Model 4 pistol introduced in 1910. *(Tokol)*

the end of the barrel—the barrel was slightly longer than the slide. This sleeve-type bushing had a *Bayonet* lock that required it to be pushed to the rear and turned to unlock it. In the Modell 3, the hammer could be locked in the cocked position with the safety. An unusual feature in this design was the placement of the ejection port on the left side of the slide. The workmanship applied to these guns was excellent and they were consequently good sellers.

Modell 4

Essentially a big brother to the Modell 3, this pistol was also introduced in 1910. Instead of a 6-shot magazine, the Model 4 had an 8-shot magazine. The grip portion of the frame was correspondingly longer. This handgun was a very popular side arm with German officers during the First World War. The Modell 4 had a 85mm barrel compared with the 67mm barrel of the Modell 3, and the Modell had a longer sleeve-type bushing. Walther received an official German government contract for 250,000 Modell 4 pistols in 1915.

Modell 5

This pistol, introduced in 1913, was an improved version of the Modell 2. As with the Modell 3 and Modell 4, the Modell 5 was built to an even higher standard of quality than the first Walther handguns. By this time (1913 to 1915), the Walther work force had grown to about 75 and the number of powered machine tools was about 50. By the middle of the World War I, the work force was 500 and the number of machine tools was 750. Walther as an arms-making concern came of age during the war.

Modell 6

Continuing their policy of adapting proven designs, and enlarging them for more powerful calibers, the Walthers took their 7.65mm caliber Modell 4 pistol and built a 9mm Parabellum version. Because they were using the powerful Parabellum cartridge in a blowback design, the Walthers tried to create a large pistol with a heavy slide and a strong recoil spring. Although the finished product was a good-looking handgun, it could not stand up to the recoil forces produced by the Parabellum cartridge. It is not clear if the German military authorities awarded a contract for the acquisition of any Modell 6 pistols, but apparently they did test them and found them unsuitable for military service use. Production of this pistol was limited to part of 1915 through early 1917. The Modell 7 was a 6.35mm version of the Modell 6.

FIGURE 8–60. The Walther 9mm Parabellum Model 6 pistol introduced in 1915. This pistol had a 121mm barrel, was 210mm overall, and weighed 960 grams. The magazine held 8 shots, and the rifling was 4 right. *(Krcma)*

FIGURE 8–61. The Walther 6.35mm Model 8 pistol introduced in 1920. This pistol was given serial number 708,944. *(Krcma)*

Modell 8

As with DWM and Mauser, the Walther factory was forced to close its doors following the 11 November 1918 Armistice that ended the war. In 1920, Carl Walther's sons (Carl had died in 1915) introduced a new 6.35mm pistol with the permission of the League of Nations. The Modell 8 had a new type of slide. The old slide and bushing had been discarded for a new form of disassembly. To remove the slide, the trigger guard was pulled downward. When this was done, the slide could be pulled further to the rear so that it could be lifted off the frame. A lug on the trigger guard usually limited the rearward travel of the slide. This disassembly system was later incorporated into the design of the PP and PPK pistols.

Modell 9

This was the last of the numbered series of Walther pistols. In 1921, the Walther factory introduced the 6.35mm Modell 9 pistol as the factory's answer to the Mauser *Westentaschenpistole.* Its construction was similar to that of the Modell 1, having a fixed barrel and open-top slide. This pistol had a striker-type firing system, and the rear end of the pin protruded from the slide when the firing striker was cocked.

Polizei Pistole

Before 1929, and despite the high quality of the workmanship at the Walther factory, there was little to distinguish their handguns from the dozens of others being manufactured throughout Europe. All of this changed with the introduction of their double-action *Polizei Pistole* (PP). The appearance of this handgun set a new standard against which all subsequent handgun designs would be evaluated. Walther was not the first company to introduce a double-action, self-loading pistol, but they were the first to create a commercially attractive and economically practical double-action self-loader. From its introduction in 1929, journalists specializing in small arms articles had nothing but praise for the PP. The individual carrying the self-loader now could have the same advantage of a quick first shot as did the invividual who carried the double-action revolver. As its name indicates, the Polizei Pistole had been designed for police use.*

Although the PP can be viewed as a simple evolution of design—it had the same disassembly system as the Modell 8—it was really a revolutionary product at the time. The Walthers had broken from their earlier solid, but conservative, approach to handgun design and had embarked upon a bold new approach. They took several good ideas and worked them into an excellent design. If there was a single theme pervading the design philosophy embodied in this pistol, it could be stated in one word: safety. Company promotional literature emphasized safety: the pistol could be carried loaded, but uncocked. It could be carried without any risk of an accidental discharge, but it also could be drawn and fired without any preliminaries. A pull on the trigger was all that was required.

In addition to the double-action feature, the PP had a loaded chamber indicator—a signal pin that protruded about 3mm from the rear of the slide when its nose pushed against

*Crowded urban conditions and a different philosophy toward police weapons had led to the virtual standardization of the 7.65mm Browning round as the police cartridge in Europe. In the United States there was a continuing prejudice against self-loaders. American police officers usually carried .38 caliber (9mm) or larger revolvers made by Colt or Smith & Wesson.

FIGURE 8–62. The Walther 6.35mm Model 9 pistol introduced in 1921. *(Tokoi)*

FIGURE 8–63. An early model of the Walther 7.65mm PP (Polizei Pistole) bearing serial number 529. This revolutionary design, introduced in 1929, had an 85mm barrel, was 162mm overall, and weighed 710 grams. The 7.65mm models had 8-shot magazines; the 9mm Kurz models had 7-shot magazines. Both had 6 right rifling. *(Visser)*

a cartridge in the chamber. The slide mounted safety catch, when applied, locked the firing pin. If applied at the time the hammer was cocked, the safety would cause the hammer to fall without discharging the chambered cartridge. There was also an automatic safety built into the design of the PP to prevent the accidental discharge of the pistol in the event that a blow was struck to the hammer when it was uncocked. A safety block was automatically interposed to prevent the hammer from contacting the firing pin. Only when the pistol was deliberately cocked—either single-action or double-action—was this blocking member withdrawn, allowing the pistol to be fired. The earliest versions of the PP had complicated firing pin assemblies, which were later simplified to reduce machining time, and thus reduce production costs.

Before the start of the Second World War, the PP was an extremely popular handgun, and the Walther factory produced it in .22 Long Rifle, 6.35mm, 7.65mm, and 9mm Kurz. The 7.65mm version was by far the most popular. Beginning in 1935, the German government began to purchase Walther PPs for issue to military, police, and *National-Sozialistische Deutsche Arbeiterpartei* (National Socialist German Labor Party) personnel. Between 1935 and April 1945 when the factory was occupied by U. S. Army personnel, the German authorities purchased about 200,000 PPs and about 150,000 of the PPK models.

Polizei Pistole Kriminal

Introduced in 1931, the *Polizei Pistole Kriminal* (PPK) was created for use by undercover police investigators. Starting with the basic PP mechanism, the Walther design staff reduced the weight from 680 grams to 539 grams and the overall length from 173mm to 85mm. The magazine capacity for the PPK, in 7.65mm, was 7 shots compared to 8 shots for the PP.

Initial PPKs were just shorter versions of the PP, but in time there were significant changes. The most significant was the elimination of the steel back strap of the grip portion of the frame. A one-piece, molded plastic grip-plate assembly was employed to form the back strap for the shooter's hand to grip against. Since the length of the PPKs grip had been shortened, the manufacturer included a plastic spur on the base plate of the magazine that formed a rest for the shooter's little finger. Base plates such as this were also used on some Walther PP magazines.

The popularity of the PP and PPK resulted in the resumption of their manufacture in the postwar period. After the war, the Walther factory was relocated to the city of Ulm/Donau because Zella-Mehlis was in the Soviet zone of occupation. But as famous as the PP and PPK were, Walther's fame rested with the P 38 military pistol that they developed

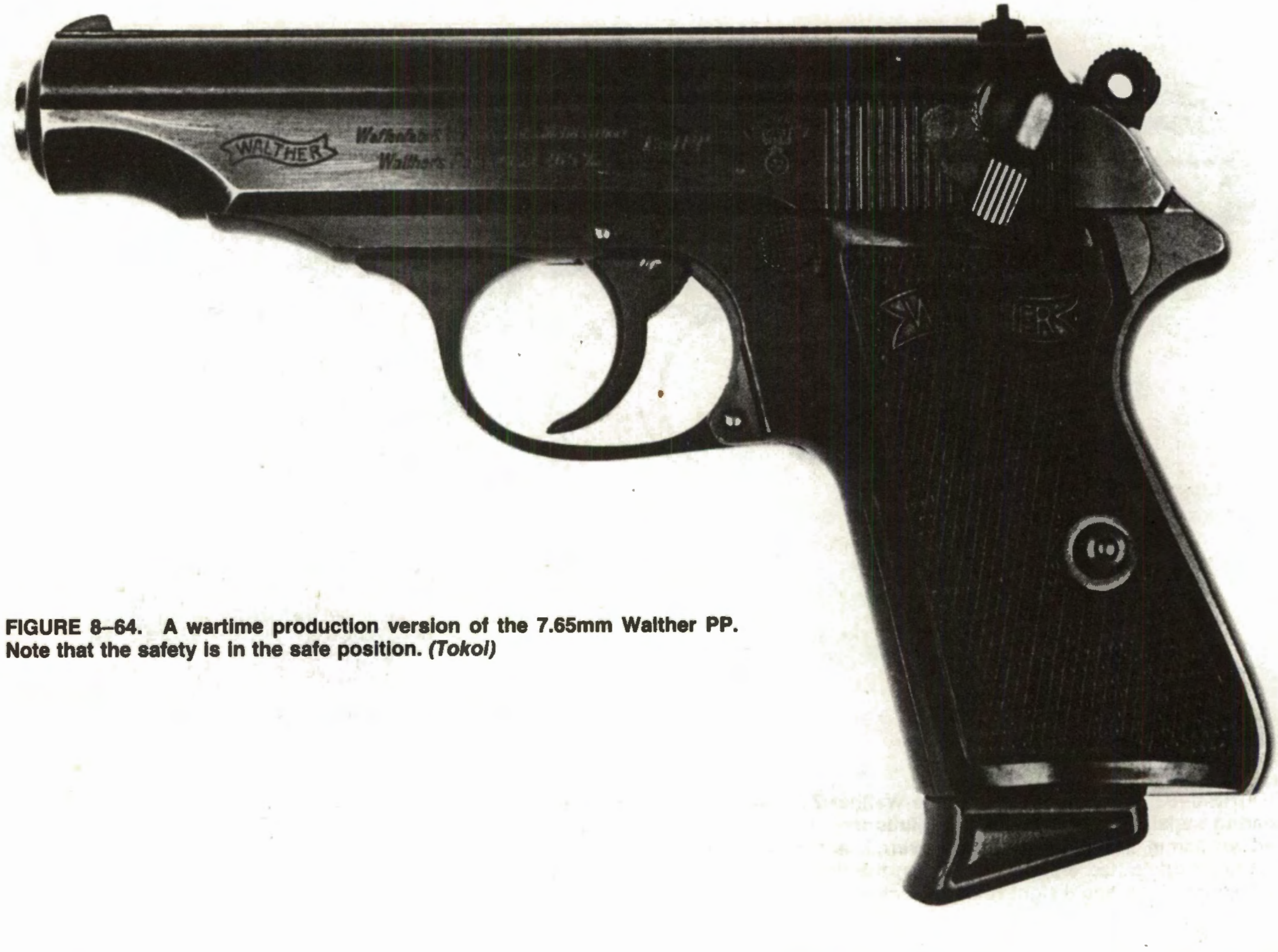


FIGURE 8–64. A wartime production version of the 7.65mm Walther PP. Note that the safety is in the safe position. *(Tokol)*

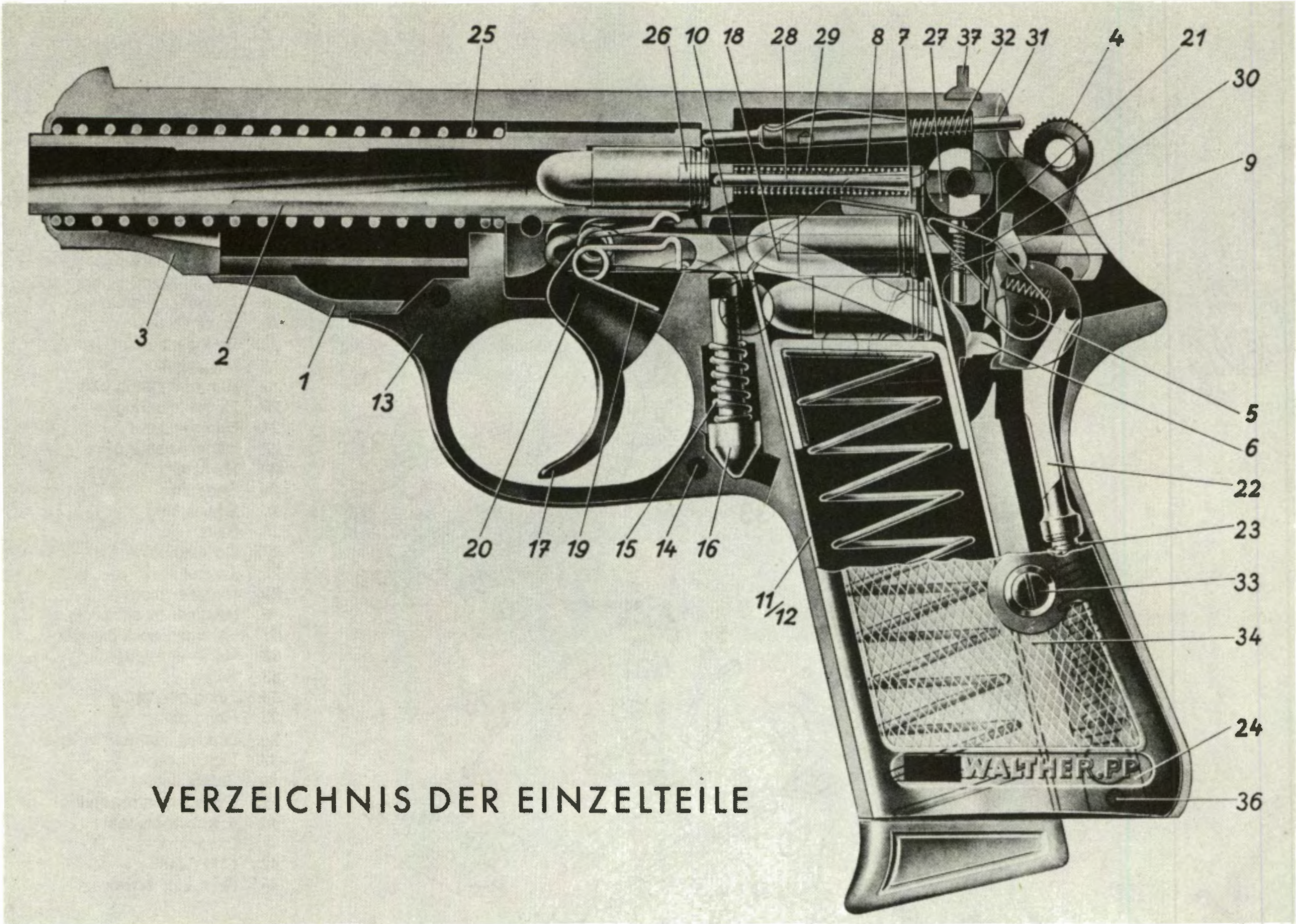


FIGURE 8–65. A section view of the Walther PP from an early wall chart. *(Walther)*

for the German army, and which replaced the P 08 as the standard service side arm of the Wehrmacht. Work on the development of a 9mm Parabellum pistol began about 1929—approximately the same time as the introduction of the PP.

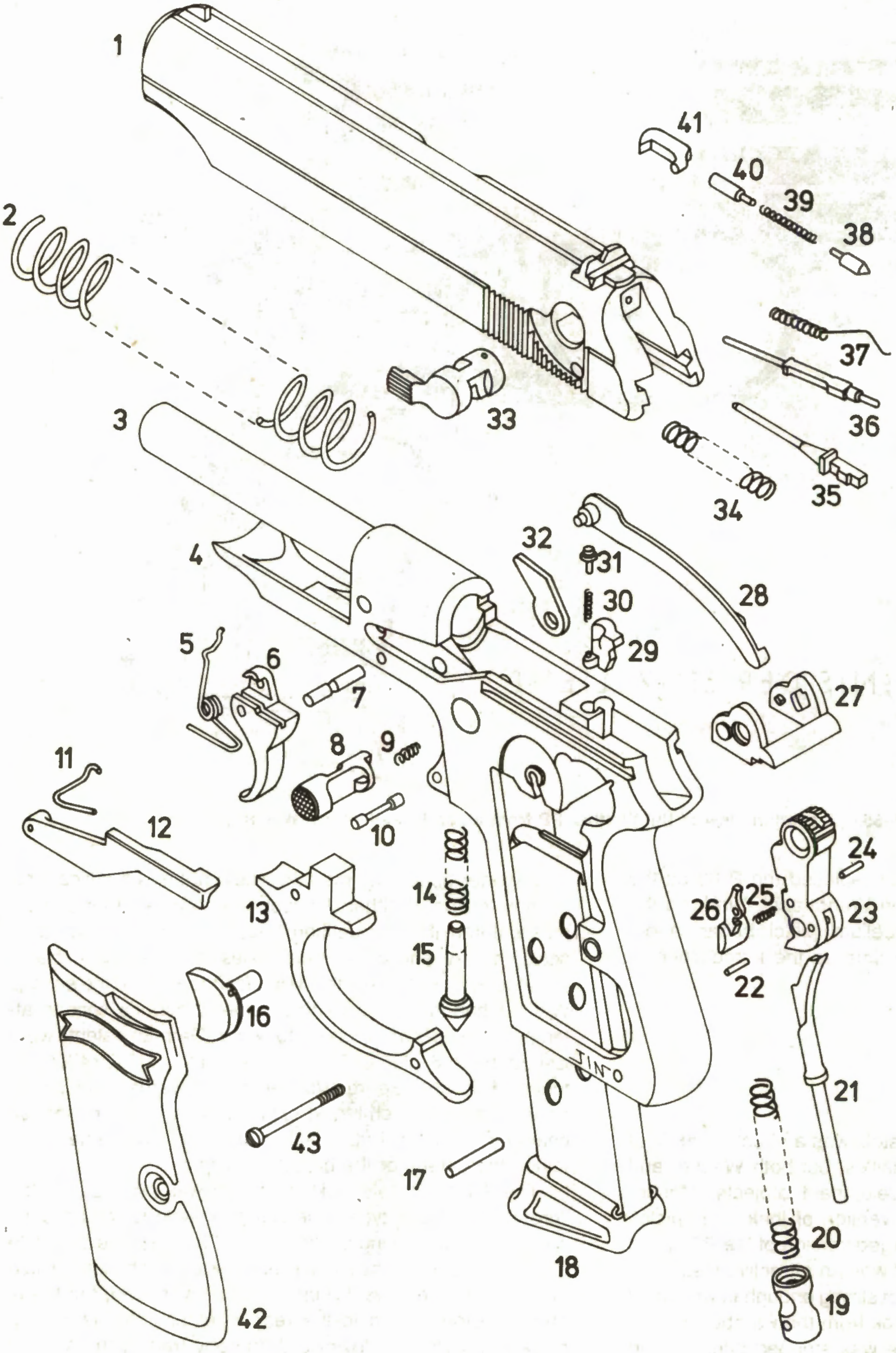
Pistole 38

Creation of 9mm Parabellum pistols was a direct violation of the terms of the Treaty of Versailles, but both Walther and Mauser carried out secret development projects. Mauser worked on a 9mm Parabellum version of their Nickl pistol, and Walther introduced an enlarged version of the PP called the *Militarpistole* (MP). The MP was an attractive pistol, but like the earlier Modell 6, it was not strong enough to withstand the beating its recoiling parts took from the Parabellum ammunition. Thus, its manufacture was stopped after a short period of time.

Work on the designs that led to the P 38 began in 1935 as a response to a request from the Heereswaffenamt. German ordnance officials wanted a replacement for the P 08 Parabellum, because that pistol was too costly and difficult to manufacture. Cost, however, was their secondary concern; these officials wanted a handgun that could be manufactured in a shorter period of time and would not tie up critical production tooling. Walther, Mauser, and several other companies entered the competition because of the lure of large scale military and commercial sales. Walther's first pistol, introduced in 1935, was the *Militarisches Pistole,* the second Walther handgun to bear this name. Walther's second attempt was the *Armee-Pistole,* for which German patents were issued in 1936 (706,038 of 10 April and 721,702 of 27 October). Eric and Georg Walther were awarded the patent protecting the breech-block, extractor, firing pin, and loaded chamber indicator. Fritz Walther and Fritz Barthlemens obtained the patent for the breech locking system.

The Armee-Pistole locking system was new. Called the "propped-up block-type," the Armee-Pistole locking system consisted of a pivoting block mounted beneath the barrel. In the locked position, the block was cammed up so that it locked the barrel to the slide. When the pistol was fired, the barrel and the slide moved to the rear together until the locking block was cammed downward, thereby freeing the slide to complete the recoil stroke. Walther's design team included two recoil springs, one on either side of the slide, to help control the recoil and to power the closing stroke.

When this pistol was tested by the Heereswaffenamt, the only serious complaint raised concerned the absence of an external hammer. The military wanted a pistol that could be cocked both single-action and double-action. This seemed



1. Slide
2. Recoil spring
3. Barrel
4. Frame
5. Trigger spring
6. Trigger
7. Trigger pin
8. Magazine catch
9. Magazine catch spring
10. Trigger guard hinge pin
11. Ejector spring
12. Ejector
13. Trigger guard
14. Trigger guard plunger spring
15. Trigger guard plunger
16. Hammer pin
17. Spring plug pin
18. Magazine
19. Hammer spring plug
20. Hammer spring
21. Hammer strut
22. Hammer strut pin
23. Hammer
24. Sear pin
25. Sear spring
26. Sear
27. Cocking piece
28. Trigger bar
29. Hammer block
30. Hammer block spring
31. Hammer block plunger
32. Hammer release
33. Safety
34. Firing pin spring
35. Firing pin
36. Loaded chamber indicator
37. Indicator spring
38. Safety detent
39. Extractor/safety spring
40. Extractor plunger
41. Extractor
42. Grip plate
43. Grip plate screw

FIGURE 8–66. An exploded view of the Walther PP. *(Jimbo)*

FIGURE 8–67. A typical Walther PPK bearing serial number Z 6689K. This pistol had an 83.5mm barrel, was 155mm overall, and weighed 575 grams. The magazine held 7 shots, and the rifling was 6 right. *(Krcma)*

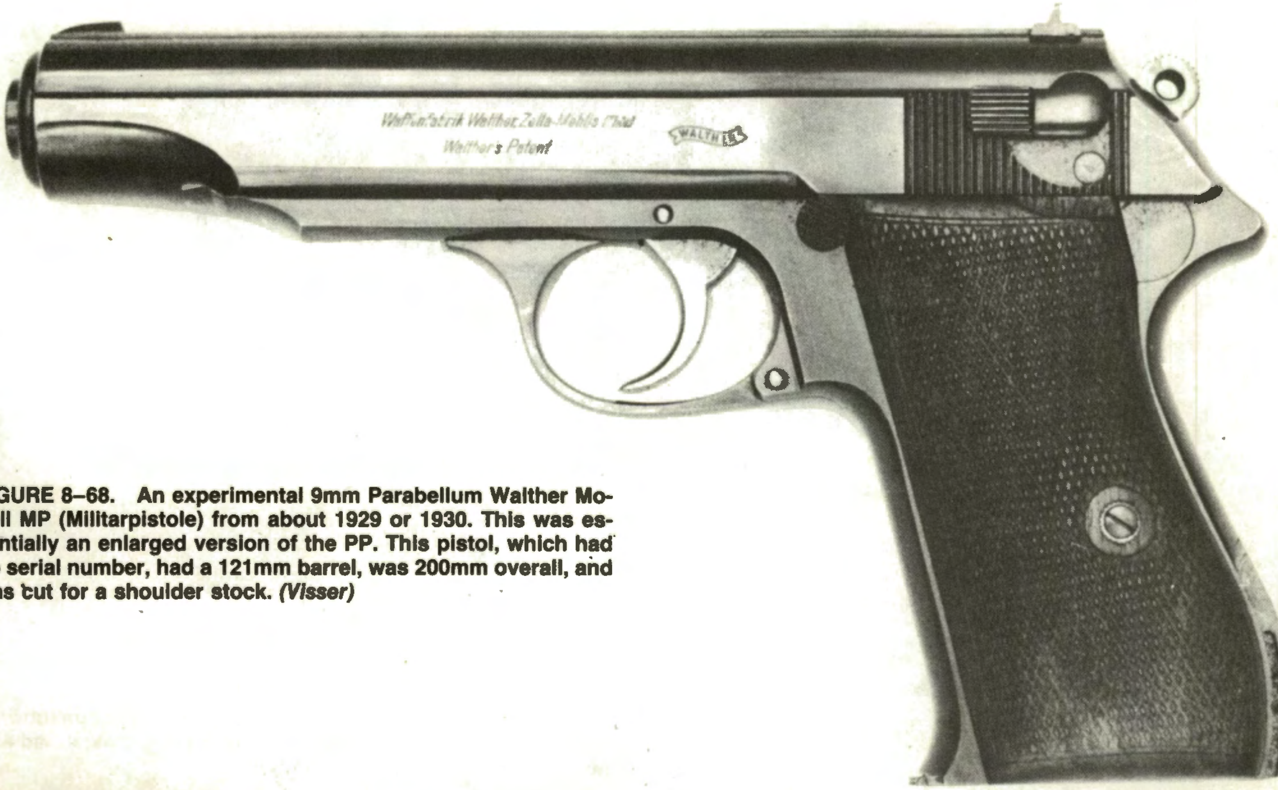


FIGURE 8–68. An experimental 9mm Parabellum Walther Modell MP (Militarpistole) from about 1929 or 1930. This was essentially an enlarged version of the PP. This pistol, which had no serial number, had a 121mm barrel, was 200mm overall, and was cut for a shoulder stock. *(Visser)*

FIGURE 8–69. Another version of the Walther MP, serial number unknown. This pistol had a 127mm barrel, and weighed about 1,110 grams. It had an 8-shot magazine, and 6 right rifling. *(U. S. Army)*

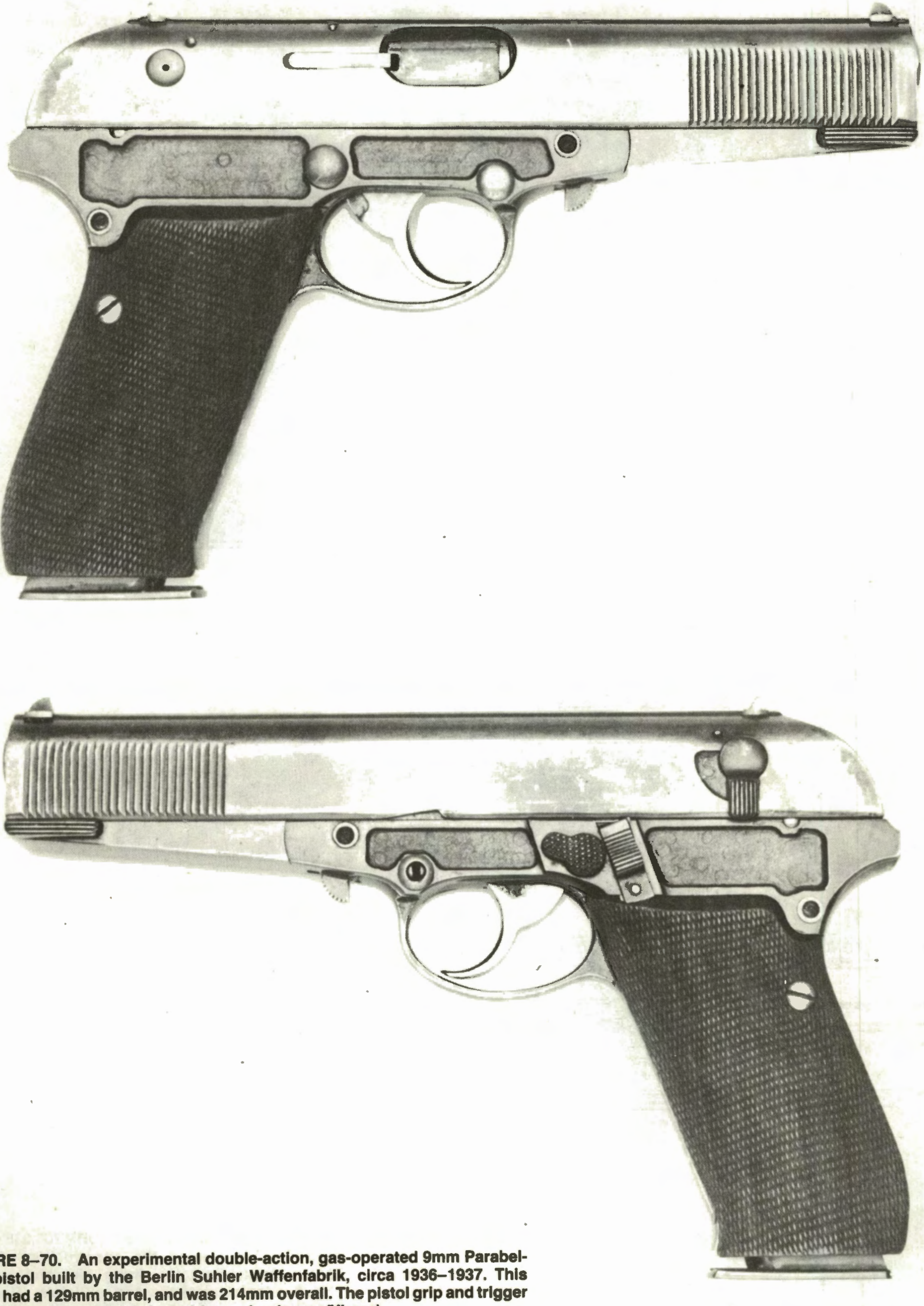


FIGURE 8–70. An experimental double-action, gas-operated 9mm Parabellum pistol built by the Berlin Suhler Waffenfabrik, circa 1936–1937. This pistol had a 129mm barrel, and was 214mm overall. The pistol grip and trigger guard assembly was fabricated from aluminum. *(Visser)*

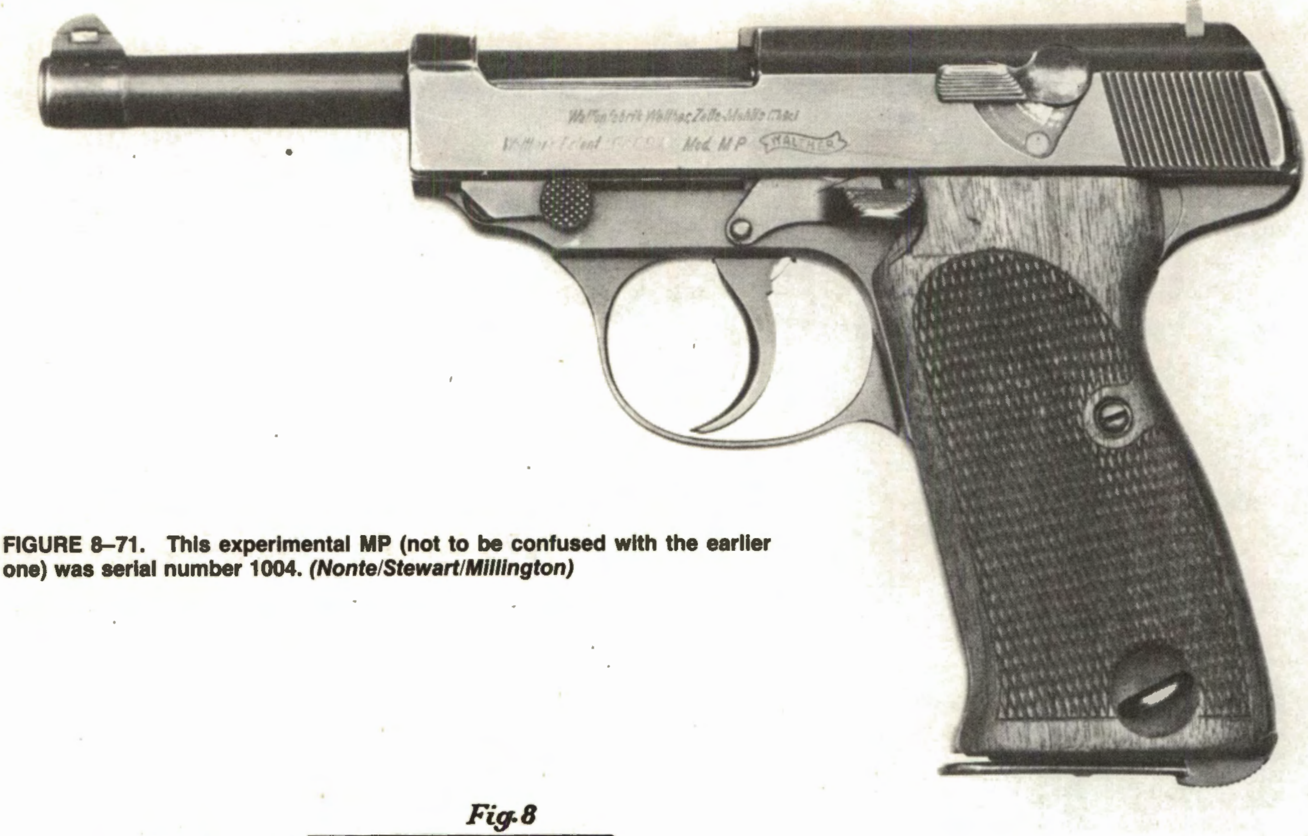


FIGURE 8–71. This experimental MP (not to be confused with the earlier one) was serial number 1004. *(Nonte/Stewart/Millington)*

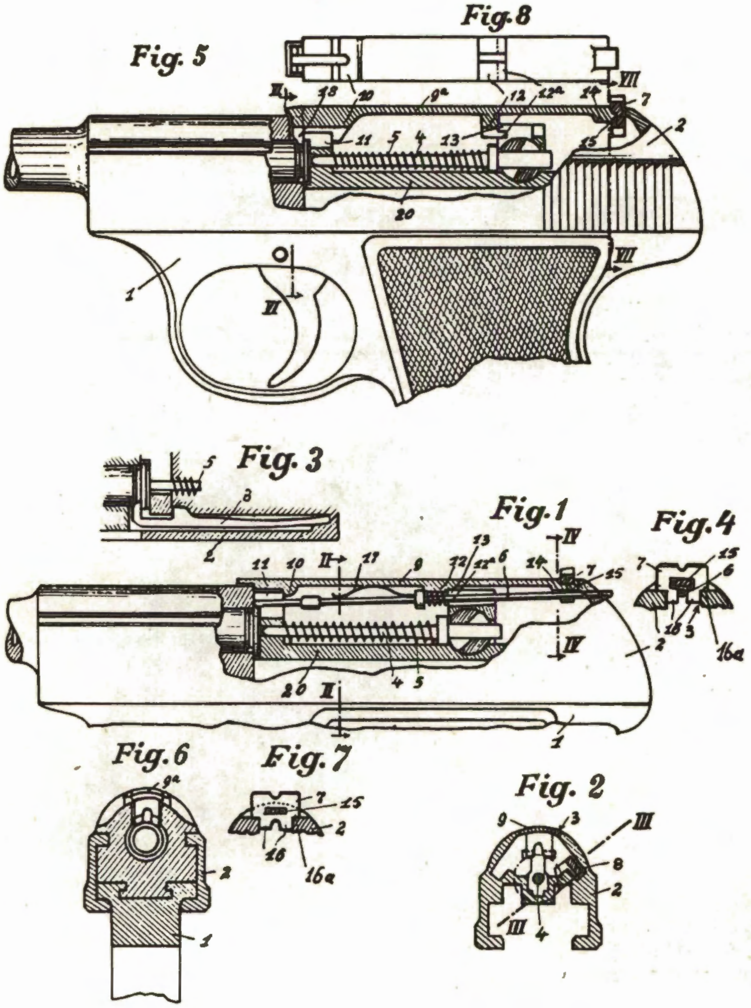


FIGURE 8–72. German patent (DRP 706,038 of 10 April 1936) protected the construction of the breech-block, extractor, firing pin, and loaded chamber indicator of the Armee-Pistole. *(German patent)*

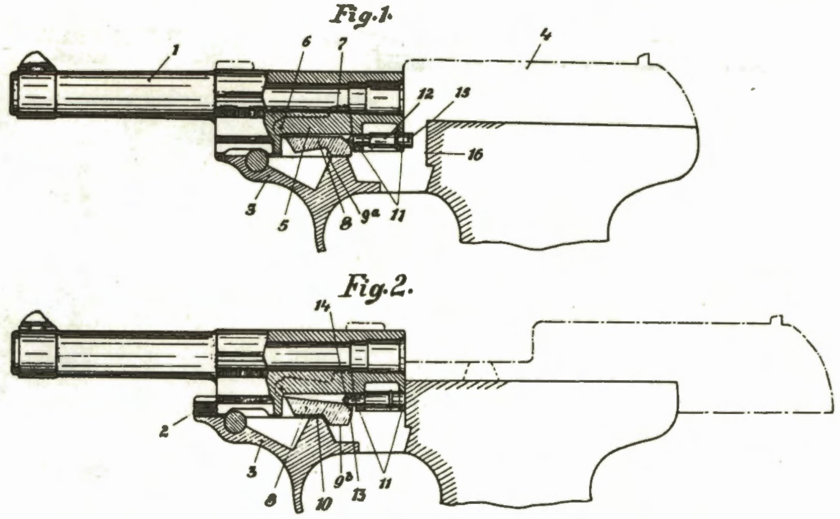


FIGURE 8–73. German patent (DRP 721,702 of 27 October 1936) protected the locking system for the Armee-Pistole and the P 38. ***(German patent)***

odd since the P 08, a striker fire-type weapon, was only capable of being carried cocked. The Armee-Pistole could be cocked with the cycling of the slide or a pull on the trigger. But as they were unaccustomed to double-action self-loaders the military wanted the option of single-action cocking offered by an external hammer. After making about 200 enclosed-hammer Armee-Pistolen, Walther introduced an external-hammer model.

Initial models of this new pistol were called the *Mod. MP,* the third time the Walther firm used this designation. After a short period of time they adopted the name *Heeres-Pistolen,* HP for short. By late 1938, the design of this locked-breech handgun had matured to the point where the Walther directors and the officials at the Waffenamt were satisfied with it. The German military standardized the Heeres-Pistolen as the *Pistole 38* (P 38).

Production of the P 38 began at the Walther factory in 1939, but issue of these pistols was delayed until 26 April 1940 because the necessary holsters were not available. In 1939, between 1,000 and 2,000 HP models were shipped to Sweden, where the handgun had been standardized as the Pistol 39.*

As so often had been the case, plans to terminate production of the P 08 were delayed because of the need for handguns generated by Germany's involvement in the Second World War. Parabellums were fabricated until 1942, and some small scale assembly continued from that time until the end of the war. As noted previously, the P 38 was an easier handgun to manufacture than the intricate P 08. The P 38 had more parts than the P 08—58 to 54, but the P 38 had been designed with mass production in mind. Claims that the P 38 cost half the price of the P 08 do not, however, agree with intelligence data collected by Allied teams at the end of the war. In 1945, the P 38 cost 31 reichsmarks ($14.00) at Mauser, and the last reported price for the P 08 at Mauser (January 1943) had been 35 reichsmarks ($12.40). The savings was not in money; it was in machine time.

Incorporating of sheet-metal stampings and coil springs speeded production and produced more durable components at the same time. The first lot of mass-produced P 38s left the factory late in 1939. These pistols were marked simply *Walther P38.* Over time the marks on the P 38 changed several times. The first 13,000 had serial numbers with an *O* prefix. About August 1940, the Heereswaffenamt assigned the Walther factory the code number *480.* Walther then reverted to the serial number 1 and placed both the serial number and the *480* code on the slide. At about serial number 7,200, circa September 1940, the factory was given a new code designation: *ac.* When the factory reached serial number 9,999, they started their numbering at 1a and then continued to 9,999a. By the end of 1941 the *j* block of serial numbers had been reached, indicating that about 110,000 P 38s had been made for the Heereswaffenamt by that date. In 1942, Walther reached the suffix *k* (about 120,000 pistols). The highest 1943 serial number was 5,800n, indicating the manufacture of 145,800 P 38s. About 125,000 P 38s were built in 1944, with the last ones having serial numbers with *l* suffixes. Only 40,000 to 42,000 P 38s were made at Walther in 1945. Thus by the end of the war Walther had delivered between 553,000 and 555,000 Pistolen 38 to the Heereswaffenamt. They also sold some commercially marked *Heeres-Pistolen* to the government, and a few thousand separately serial-numbered P 38s were provided for police issue.

In May of 1941, the Heereswaffenamt had instructed the Mauser technical staff to begin preparations for the manufacture of the P 38. Mauser's engineers began tooling up in July of 1941 and assembled their first P 38s late in September 1942. Initial deliveries to the armed forces were made in November. Mauser's pistols were marked with the code *byf* until January, 1945 when it was changed to *svw.* By the end

*Sweden later adopted the Finnish Lahti pistol when supplies of the HP were cut off because of demands for the pistol from the Wehrmacht (chapter 15).

FIGURE 8–75. Walther's Armee-Pistole serial number 013. *(U. S. Army)*

of 1942, they had reached serial number circa 4,994a for a total production of about 15,000. Mauser did not stop its serial numbers at the end of each calender year, as did Walther. It is estimated that Mauser built about 150,000 P 38s in 1943 and another 204,000 from 1944 through the fall of the factory to the French on 20 April 1945. Mauser's total P 38 production probably was in the range of 329,000. An additional 5,650 P 38s were delivered to non-Heereswaffenamt organizations such as the police.

In May of 1943, the Heereswaffenamt instructed the Spreewerke GmbH, which had factories at Spandau in Germany and Hradkoú-nad-Nisou in Czechoslovakia, to establish a P 38 production line. With assistance from technicians from Mauser, the Spreewerke got production underway by the end of 1943. The Spreewerke, code *cyg,* achieved the highest monthly production rates for the P 38, largely because they had all the lessons learned by Walther and Mauser personnel and because they had the newest set of tooling. In 1944, Walther averaged about 10,000 P 38s a month; Mauser about 12,500 per month; and the Spreewerke reached a monthly average of about 25,000 at one point. In all the Spreewerke produced about 260,000 P 38s. They added letters as prefixes to their blocks of serial numbers. Unlike the Walther and Mauser pistols the Spreewerke did not have the year stamped on the slide. Further, the Spreewerke did not start with serial number 1 at the beginning of each year.

During the wartime production of the P 38, the Heereswaffenamt acquired parts from several captured factories. The Böhmische Waffenfabrik, AG (the Česká Zbrojovka) in Prague made barrels for both Walther and the Spreewerke. Another Czechoslovakian firm, the Erste Nordböhmische Waffenfabrik made magazines coded *jvd.* In Belgium, the Fabrique National d'Armes de Guerre built 4,720 frames and

FIGURE 8–74. A long-barrel version of the experimental Walther Armee-Pistole, with serial number 010. The barrel length was 200mm and the overall length was 293mm. *(Visser)*

FIGURE 8–76. Walther's Armee-Pistole serial number 020. *(Nonte/Stewart/ Millington)*

FIGURE 8–77. Walther's Armee-Pistole serial number 050. *(Nonte/Stewart/ Millington)*

FIGURE 8–78. Two experimental Walther MPs. *Top,* serial number 015; *bottom,* serial number 017. *(U. S. Army)*

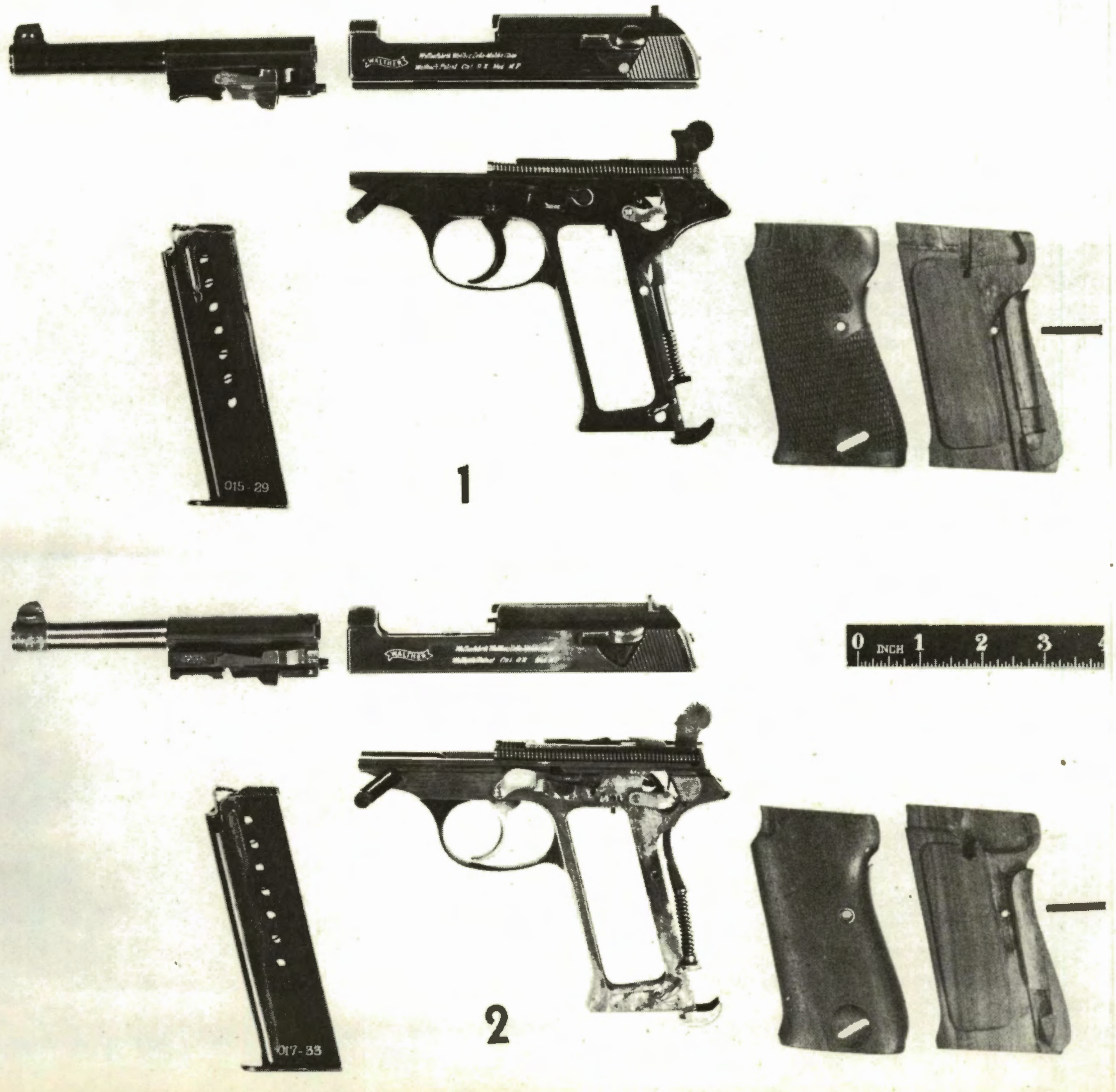


FIGURE 8–79. A Walther Heeres-Pistole serial number 8387 in caliber 9mm Parabellum. *(Krcma)*

FIGURE 8–80. Walther's Heeres-Pistole in caliber 7.65mm Parabellum. ***(U. S. Army)***

2,272 slides between August 1943 and September 1944. All three German prime contractors used these parts to finish pistols. C. G. Haenel Waffen-und Fahrradfabrik AG of Suhl, code *fxo,* supposedly made magazines. The Brno factory in Czechoslovakia also was supposed to have made slides.

Total wartime production of the P 38 at the three factories was about 1,144,000. The French army continued production of the P 38 for a short time after their occupation of the Mauser factory on 20 April 1945. These gray phosphate-finish P 38s were issued to French military organizations. Walther had abandoned their brightly polished and blued finish during the war in favor of a dull, nonreflective finish. While the exterior appearance of the P 38 deteriorated as time passed, the basic quality of the weapons remained excellent until the final months of the war. After a twelve year hiatus, Walther renewed production of the P 38 in 1957. Redesignated the *Pistole 1* (P 1), this was the standard side arm of the Bundeswehr until 1980. The Heckler & Koch PSP was standardized as the P 7. This self-loader still utilized the 9mm Parabellum cartridge, which is currently the standard pistol

FIGURE 8–81. A pilot production model of the Walther P 38 pistol. *(U. S. Army)*

FIGURE 8–82. This P 38, serial number 01, was one of the first 50 delivered to the Heereswaffenamt in 1939. *(Nonte/Stewart/Millington)*

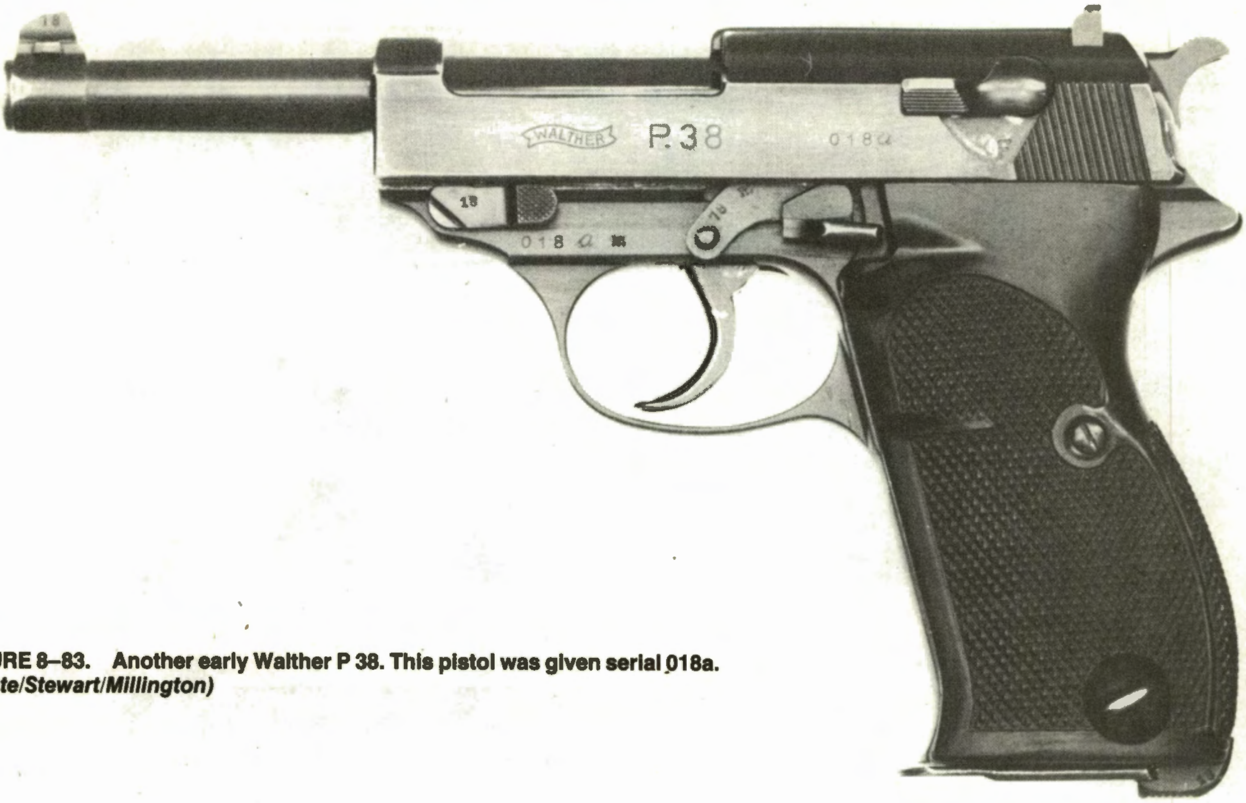


FIGURE 8–83. Another early Walther P 38. This pistol was given serial 018a. ***(Nonte/Stewart/Millington)***

FIGURE 8–84. A Walther-made P 38 dating from 1940. It was given serial number 6422a.

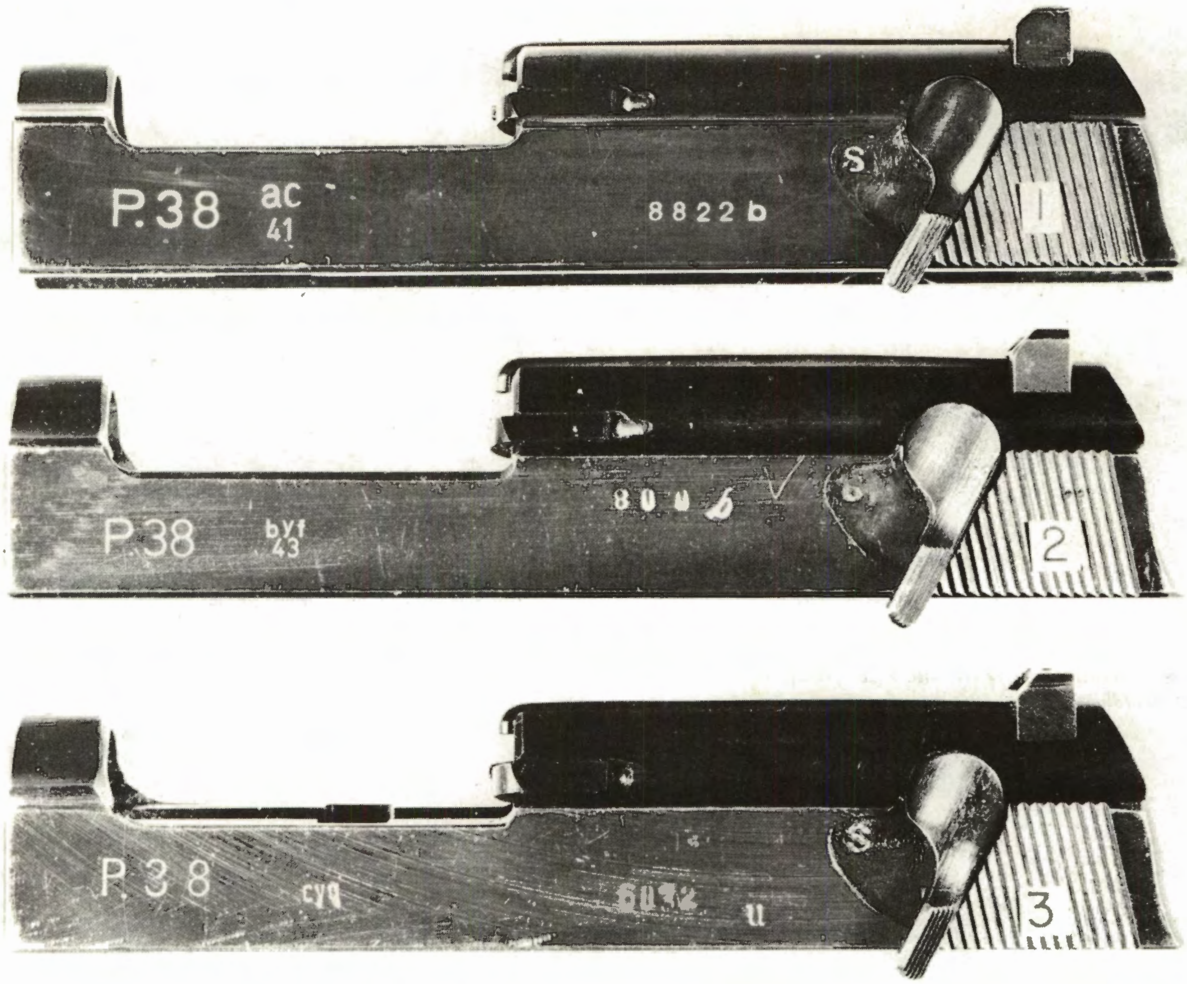


FIGURE 8–85. Slide markings of P 38 pistols produced during the Second World War. *Top,* Walther was assigned the factory code *ac. Middle,* Mauser was assigned the code *byf. Bottom,* the Spreewerk was assigned the code *cyq.* Mauser used the code *svw* after January, 1945. *(U. S. Army)*

TABLE 8-2 GERMAN MILITARY PISTOLS, 1914-1918

Model	*Caliber (mm)*	*Barrel length (mm)*	*Overall length (mm)*	*Weight (g)*	*Feed device capacity*	*Quantity acquired*
P 08	**9 Parabellum**	**100**	**216**	**885**	**8**	**1,355,200 during war**
Beholla-Selbstlade-pistole	**7.65 Browning**	**73**	**140**	**640**	**7**	**ca. 30,000**
Dreyse Selbstlade-pistole, M.1907	**7.65 Browning**	**93**	**160**	**710**	**7**	**ca. 100,000**
Dreyse Selbstlade-pistole, 9mm	**9 Parabellum**	**126**	**206**	**1050**	**8**	**ca. 50 for trials**
Langenham Armee-Model or *FL-Selbstlader*	**7.65 Browning**	**105**	**168**	**670**	**8**	**ca. 67,500**
Mauser M/96	**9 Parabellum**	**121**	**280**	**1130**	**10**	**ca. 140,000 to 150,000**
Walther Modell 4	**7.65 Browning**	**85**	**152**	**550**	**8**	**ca. 250,000 to 275,000**
Walther Modell 6	**9 Parabellum**	**121**	**210**	**960**	**8**	**ca. 1,000**

FIGURE 8–86. A P 38 made by Mauser in Oberndorf after the end of World War II for the French Occupation Forces. This *svw* pistol was assigned serial number 5142k. *(Krcma)*

FIGURE 8–87. A section view of the Walther P 38. *(Walther)*

cartridge for the North Atlantic Treaty Organization (NATO).

During World War II, as had been the case in the first war, the German military pressed a number of nonstandard-type pistols into service. These pistols are listed in Table 8–3. One of the pistols noted in that table, but not mentioned previously, is the Sauer Modell 38H (H for hammer fire) This extremely clever design would probably have been a major commercial success, but the war intervened. As it was, about 200,000 were acquired for the German armed forces. Although this was a concealed hammer-type self-loader, the designers provided for a lever on the left side of the frame for cocking and uncocking the hammer. As a result this pistol could be fired either double-action or single-action. An excellent design and built to the highest standards, the Sauer Modell 38H died with the war. J. P. Sauer und Sohn renewed their handgun business after the war, but they did not revive the Modell 38H.

TABLE 8-3 GERMAN MILITARY PISTOLS, 1939-1945

Model	*Caliber (mm)*	*Barrel length (mm)*	*Overall length (mm)*	*Weight (g)*	*Feed device capacity*	*Quantity acquired*
P 08	**9 Parabellum**	**100**	**216**	**885**	**8**	**ca. 940,000 (1934–1942)**
P 38	**9 Parabellum**	**127**	**213**	**840**	**8**	**ca. 1,144,000**
Mauser Modell 1934	**7.65 Browning**	**87**	**153**	**600**	**8**	**ca. 95,000**
Mauser HSc	**7.65 Browning**	**86**	**152**	**610**	**8**	**ca. 225,000**
Sauer Behör den-Modell	**7.65 Browning**	**77**	**146**	**620**	**7**	**ca. 135,000**
Sauer 38H	**7.65 Browning**	**83**	**171**	**705**	**8**	**ca. 200,000**
Walther PP	**7.65 Browning**	**85**	**162**	**660**	**7**	**ca. 200,000**
Walther PPK	**7.65 Browning**	**80**	**148**	**580**	**6**	**ca. 150,000**
Steyr Modell 1912	**9 Parabellum**	**128**	**216**	**1,025**	**8**	**ca. 50,000 converted to Parabellum**
FN-Browning Modèle 10/22	**7.65 and 9 Browning**	**115**	**182**	**710**	**9 in 7.65mm 8 in 9mm**	**ca. 363,200**

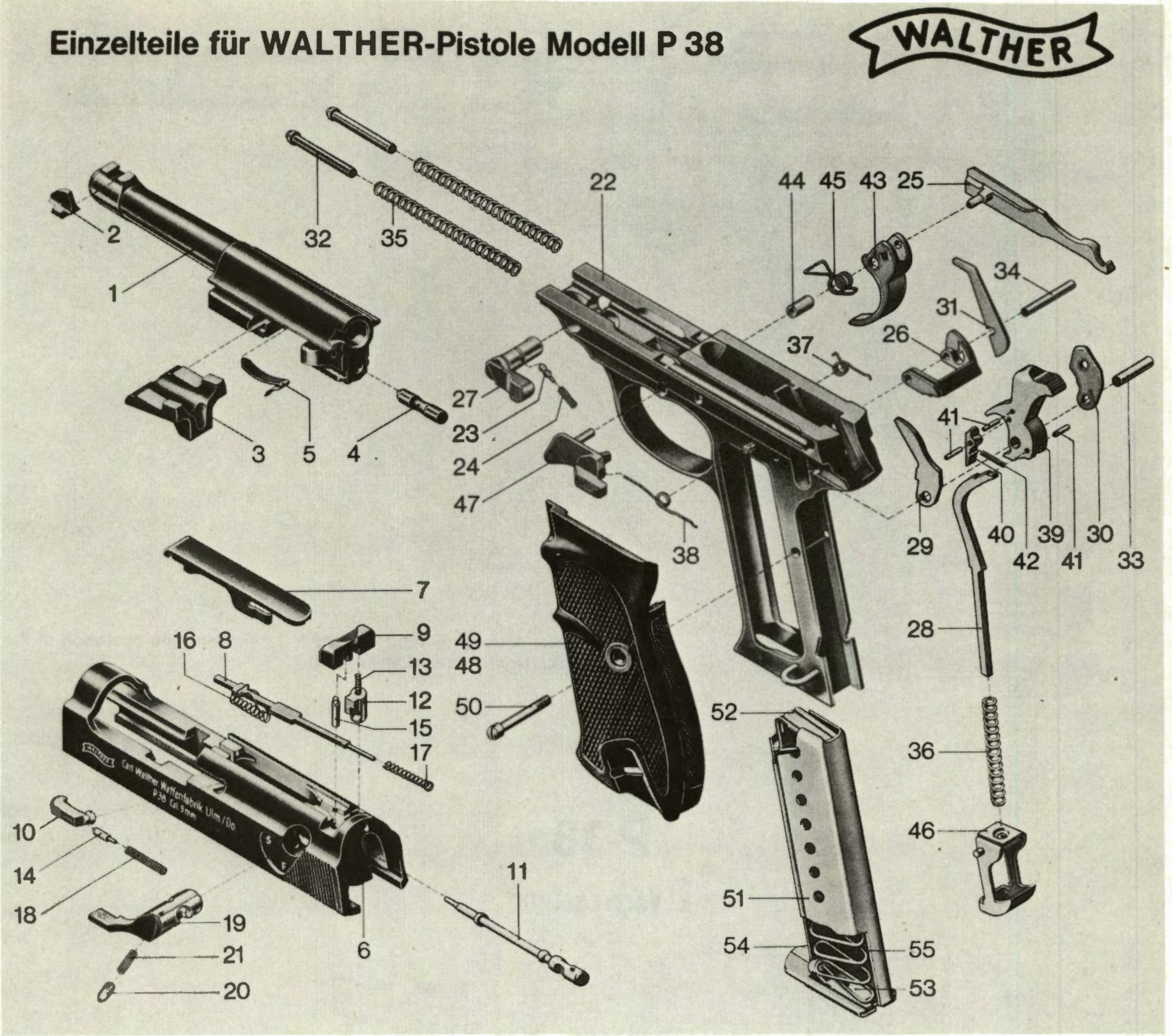


FIGURE 8–88. An exploded view of the P 38. *(Walther)*

1. Barrel
2. Front sight
3. Locking block
4. Unlocking pin
5. Block retainer
6. Slide
7. Slide cover
8. Loaded chamber indicator
9. Rear sight
10. Extractor
11. Firing pin
12. Disconnector plunger
13. Plunger spring
14. Plunger
15. Retainer pin
16. Firing pin spring
17. Indicator spring
18. Ejector spring
19. Safety catch
20. Safety detent
21. Safety spring
22. Frame
23. Takedown detent
24. Detent spring
25. Trigger bar
26. Sear
27. Takedown catch
28. Hammer strut
29. Hammer release
30. Disconnector
31. Ejector
32. Spring guides
33. Hammer pin
34. Sear pin
35. Recoil spring
36. Hammer pin
37. Bar spring
38. Sear spring
39. Hammer
40. Hammer lifter
41. Pin
42. Spring
43. Trigger
44. Trigger bushing
45. Trigger pin
46. Magazine catch
47. Hold-open latch
48. Grip plate
49. Grip plate
50. Grip plate screw
51. Magazine
52. Follower
53. Base plate retainer
54. Base plate
55. Spring

FIGURE 8–89. A cutaway model of the P 38 showing the operation of the locking block. *(Nonte/Stewart/Millington)*

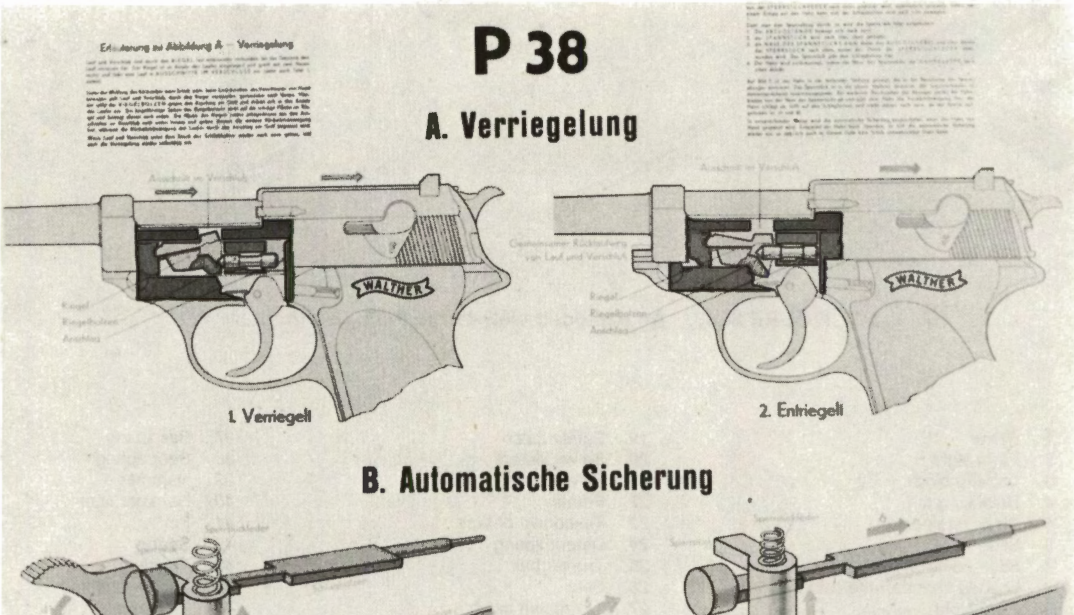


FIGURE 8–90. Illustrations from a Walther instruction chart. *Top,* figure A illustrates the functioning of the locking system. *Bottom,* figure B illustrates the operation of the automatic safety that blocks the hammer and prevents accidental discharge when the hammer is uncocked. *(Walther)*

FIGURE 8–91. Illustrations from a Walther instruction chart. The top view shows the P 38 ready to fire. The bottom view shows it during ejection. *(Walther)*

FIGURE 8–92. This Modell 30 7.65mm Browning caliber pistole, often designated the *Behorden Modell* (Authorities Model), built by J. P. Sauer und Sohn of Suhl, was purchased by the German military in limited quantities and issued during World War II. It had a 75mm barrel, was 146mm overall, and weighed 621 grams. It had a 7-shot magazine and the barrel was rifled 7 right. ***(Krcma)***

FIGURE 8–93. The 7.65mm Modell 38H pistol manufactured by J. P. Sauer und Sohn of Suhl. This pistol was given serial number 292,981. *(Tokoi)*

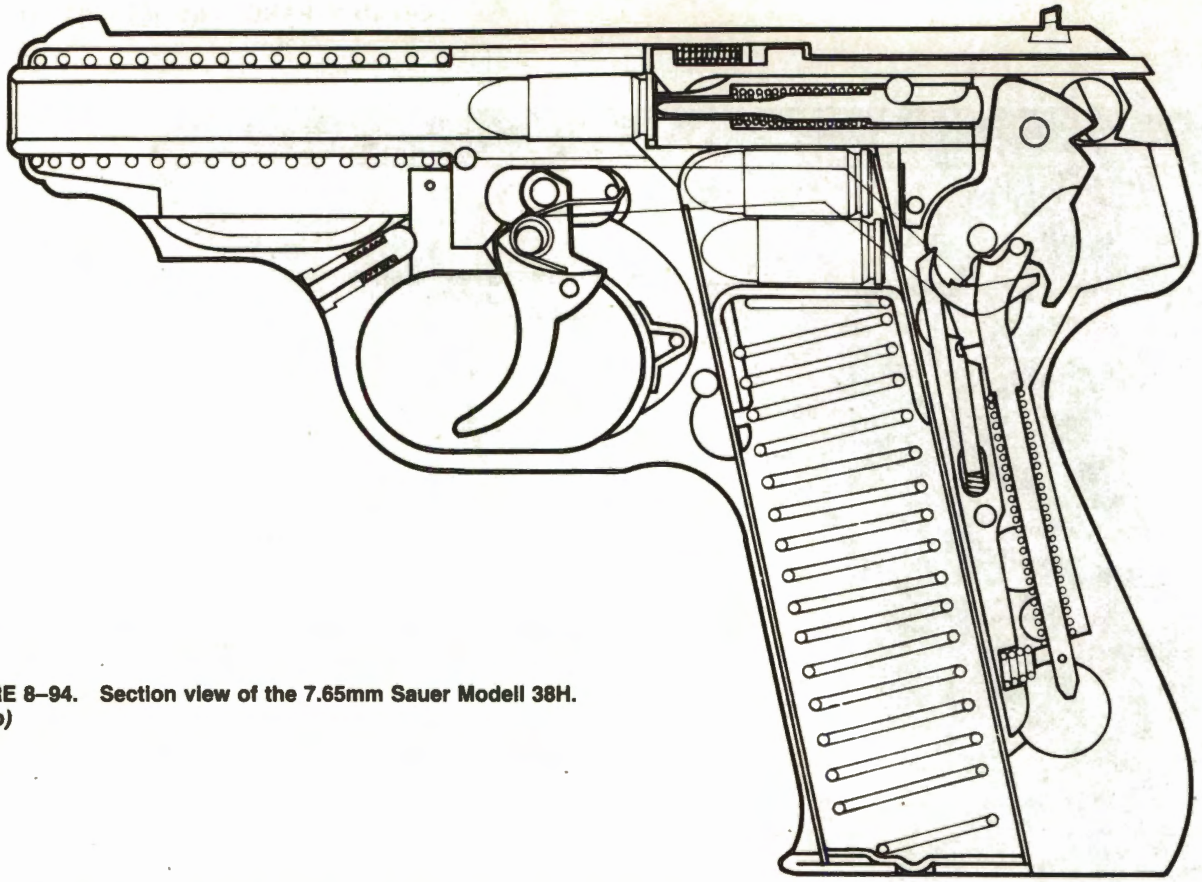


FIGURE 8–94. Section view of the 7.65mm Sauer Modell 38H.
(Jimbo)

TABLE 8-3 GERMAN MILITARY PISTOLS, 1939-1945 (continued)

Model	*Caliber (mm)*	*Barrel length (mm)*	*Overall length (mm)*	*Weight (g)*	*Feed device capacity*	*Quantity acquired*
FN-Browning Modele 35 GP	**9 Parabellum**	**119**	**197**	**915**	**13**	**ca. 319,000**
CZ vz.27	**7.65 Browning**	**99**	**162**	**710**	**9**	**ca. 400,000**
CZ vz.38	**9 Browning**	**120**	**198**	**920**	**9**	**ca. 20,000**
French Modèle 35.A	**7.65 French long**	**100**	**200**	**730**	**8**	**less than 25,000**
Unique Modèle 17	**7.65 Browning**	**81**	**151**	**785**	**9**	**ca. 56,000**
Unique Kriegs modell	**7.65 Browning**	**81**	**151**	**785**	**9**	**ca. 24,550**
MAB Modèle A	**6.35 Browning**	**66**	**116**	**400**	**6**	**Unknown, but small numbers issued to staff officers**
MAB Modèle C	**7.65 Browning**	**84**	**157**	**650**	**7**	**ca. 2,600**
MAB Modèle D	**7.65 Browning**	**104**	**177**	**705**	**9**	**ca. 50,000**
Pisztolý 37M	**7.65 Browning**	**101**	**174**	**760**	**7**	**ca. 95,500**
Model 1914 (Norwegian Colt)	**11.25 Colt**	**128**	**218**	**1,055**	**7**	**ca. 7,000**
wz.35 VIS	**9 Parabellum**	**121**	**207**	**835**	**8**	**ca. 385,000**
Astra 200	**6.35 Browning**	**61**	**110**	**340**	**8**	**ca. 1,510**
Astra 300	**7.65 and 9 Browning**	**100**	**161**	**640**	**9**	**ca. 85,390**
Astra 400	**9 Largo**	**151**	**226**	**1,035**	**8**	**ca. 6,000**
Astra 600	**9 Parabellum**	**135**	**208**	**1,030**	**8**	**ca. 10,450**
Astra 900	**7.63 Mauser**	**140**	**288**	**1,200**	**10**	**ca. 1,050**
Astra 903	**7.63 Mauser**	**160**	**308**	**1,275**	**10 or 20**	**ca. 2,004**
Star Modelo B	**9 Parabellum**	**127**	**216**	**1,065**	**8**	**ca. 34,000**

1. Slide
2. Recoil spring
3. Barrel
4. Frame
5. Takedown latch
6. Takedown detent
7. Takedown detent spring
8. Takedown detent screw
9. Latch crosspin
10. Trigger
11. Trigger spring
12. Trigger pin
13. Magazine catch spring
14. Magazine catch
15. Magazine catch screw
16. Cocking lever spring
17. Hammer lever
18. Cocking lever
19. Retainer washer
20. Cocking lever screw
21. Hammer extension
22. Magazine
23. Sear disconnector
24. Disconnector spring
25. Spring retainer
26. Sear
27. Sear spring
28. Hammer spring
29. Hammer strut
30. Hammer
31. Trigger bar
32. Ejector
33. Pin
34. Magazine safety bar
35. Retainer
36. Spring
37. Safety detent
38. Spring
39. Safety
40. Breech block retainer pin
41. Firing pin
42. Firing pin spring
43. Breech block
44. Loaded chamber indicator
45. Extractor
46. Retainer
47. Spring
48. Grip plate
49. Grip plate screw

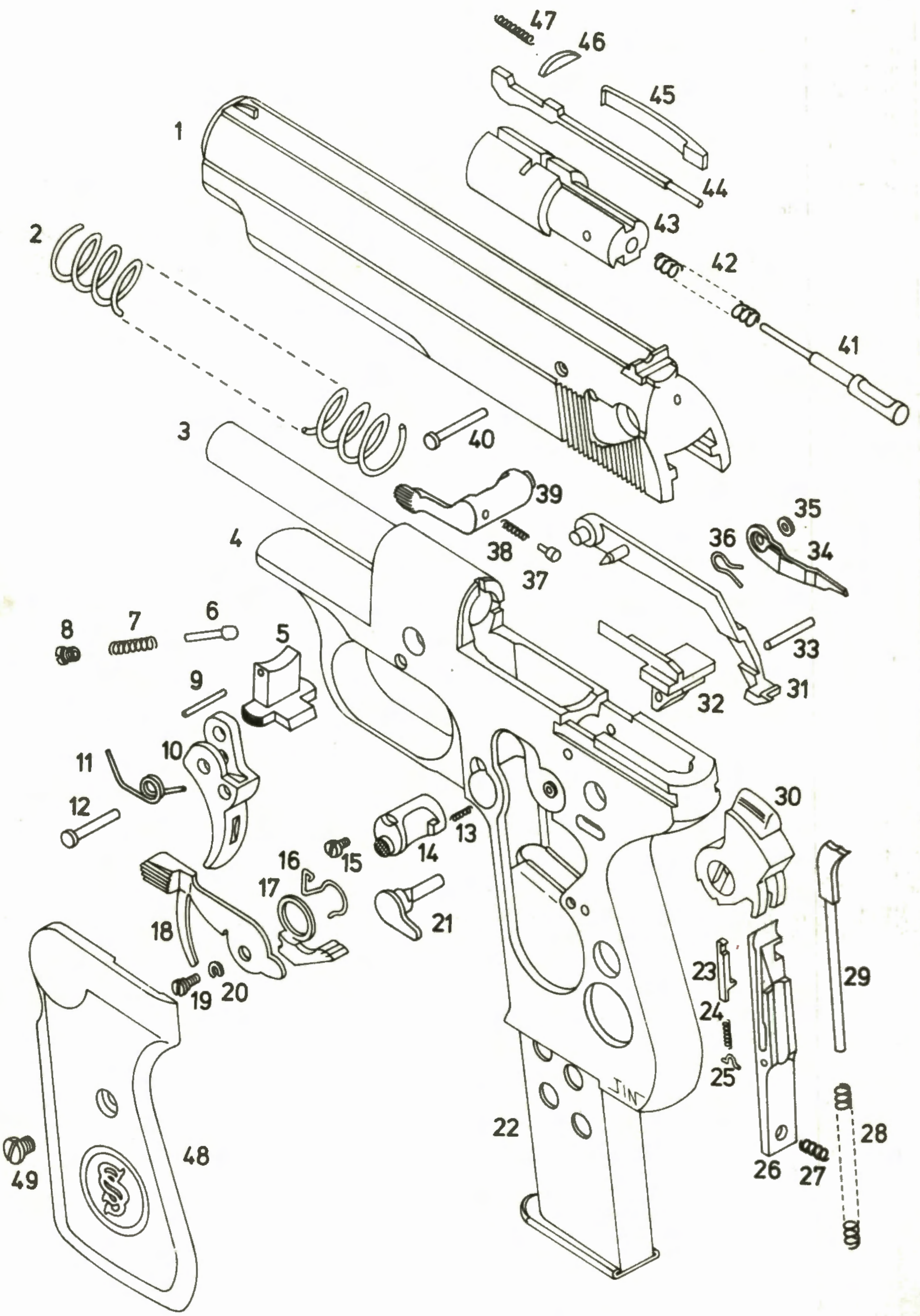


FIGURE 8–95. Exploded view of the Sauer Modell 38H. *(Jimbo)*

NOTES

The following sources were used in the preparation of this chapter:

Belford, James N., and Dunlap, Jack. *The Mauser Self-Loading Pistol.* Alhambra, CA: Borden Publishing Company, 1969.

Breathed, Jr., John W., and Schroeder, Jr., Joseph J. *System Mauser: A Pictorial History of the Model 1896 Self-Loading Pistol.* Chicago: Handgun Press, 1967.

Bridgeforth, Robert. "Theodor Bergmann's Self-Loading Firearms." 31pp. offset publication by author, 1978.

Hoffschmidt, E. J. *Know Your Walther PP & PPK Pistols.* Stamford, CT: Blacksmith Corp., 1975.

Hoffschmidt, E. J. *Know Your Walther P.38 Pistols.* Stamford, CT: Blacksmith Corp., 1974.

Hogg, Ian V., and Weeks, John. *Pistols of the World.* London et al: Arms and Armour Press, 1978.

Korn, R. H. *Mauser-Gewehr und Mauser Patente.* Berlin: Ecksteins biographischer Verlag, 1908.

Mathews, J. Howard. *Firearms Identification,* Vol. 1. Springfield, IL: Charles C. Thomas, Publisher, 1973.

Nonte, George C. *Walther P-38 Pistol.* Wickenburg, AZ: Normount Technical Publications, 1975.

Pender, Roy G. III. *Mauser Pocket Pistols, 1910–1946.* Houston, TX: Collectors Press, 1971.

Smith, W. H. B. *Mauser, Walther & Mannlicher Firearms.* Harrisburg, PA: Stackpole Books, 1971.

Walter, John. "The Development and Production of the P 38," *Shooter's Bible, 1978.* Hackensack, NJ: Stoeger Publishing Company, 1977.

Walter, John. *Luger: An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present Day.* London: Arms and Armour Press, 1977.

Whittington, Robert D. III. *German Pistols and Holsters, 1934–1945: Military—Police—NSDAP.* Dallas Brownlee Books, 1969.

9 FRENCH HANDGUNS 1900 to 1938

Until the First World War, the revolver was the basic handgun of the French military forces. During that conflict, the French purchased between 600,000 and 700,000 Ruby-type 7.65mm Browning caliber pistols from the arms manufacturers of the Basque region of Spain. In 1920 when an inventory of French small arms was made, there were about 580,000 7.65mm pistols in the hands of troops or in military depots. The majority of these were Ruby-type, Star-type, and Savage 1917s, and many were still in use throughout the 1920s and 1930s.* After the 1914 to 1918 war, private organizations and the French government experimented with self-loading pistols with which to replace these World War-vintage handguns.

The Manufacture d'Armes de St. Étienne (MAS), a government arsenal, was one of the groups assigned to develop a new pistol. By 1925, designers at MAS had a firing model of a blowback self-loader ready for trials. The MAS 1925 M No. 1 was probably an experimental model, and although several variants were developed apparently none were manufactured.

In 1934, the French government sponsored a competition to find a suitable military self-loader. In addition to an FN Browning pistol (model uncertain) and an entry from MAS (probably the *SE M.A.S. 1932 Type A No. 4,* evolved from the 1925 design), a pistol made by the Société Alsacienne de Constructions Mecaniques (SACM) was also submitted. The SACM pistol was an adaptation of the Colt Browning Model 1911 done by the Swiss-born designer Charles Petter. His basic change to the Browning pistol was the employment of a firing mechanism that could be removed as a single unit (French patent 185,452 of 1934). It was chambered to fire the French 7.65 × 20mm long cartridge, which apparently was derived from the ammunition developed for the U.S. Model 1918 Pedersen device that was used to convert the U.S. Model 1903 Springfield to a semiautomatic rifle. Although more powerful than the 7.65mm Browning, the 7.65 × 20mm cartridge was no better than the 9mm Browning round and significantly weaker than the 9mm Parabellum. SACM's *Pistolet Automatique Modèle 1935A,* after trials in 1935 and 1936, was standardized by the French in 1936. Two years later, after the necessary factory preparations, it was put into production at the SACM works at Cholet. The French army's initial order for 10,500 Modèle 1935A pistols was being filled when the Germans captured the factory on 23 June 1940. (Only 3,500 pistols had been built: 1,900 for the army, 500 for the navy, and 300 for the air force. SACM employees took 800 pistols with them when they evacuated

*See chapter 13 for information about the Spanish-made copies of the FN Browning Modèle 1903.

FIGURE 9–1. Pistolet automatique, type Ruby. A typical 7.65mm Browning caliber Elbar pistol of the type sold to France during World War I. This *Lusitania* was produced by an unknown Spanish manufacturer. *(Krcma)*

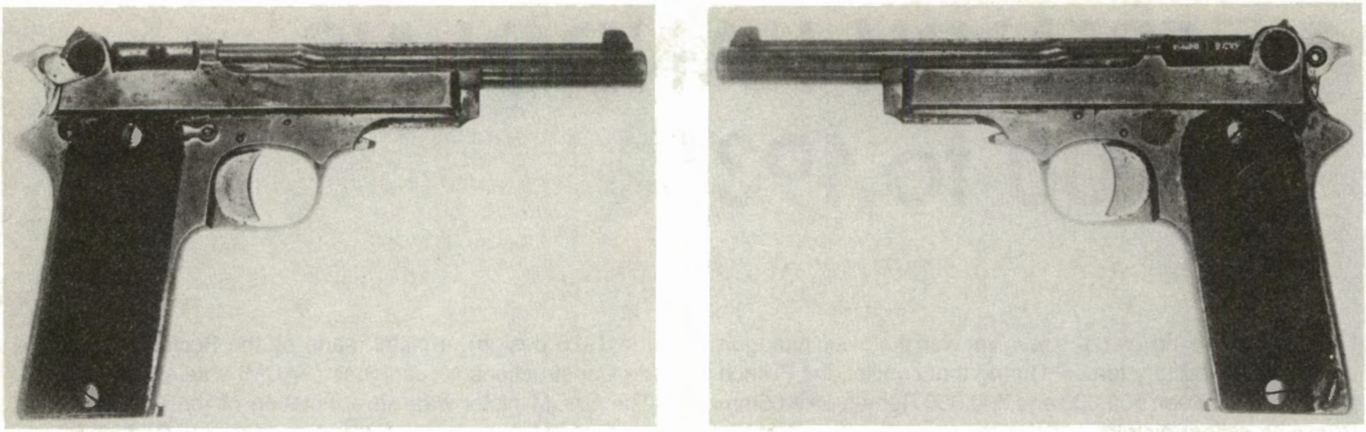


FIGURE 9–2. Pistolet automatique, type Star. A typical 7.65mm Browning caliber Star of the type sold to France during World War I. This pistol is numbered 47,977. *(Mezger)*

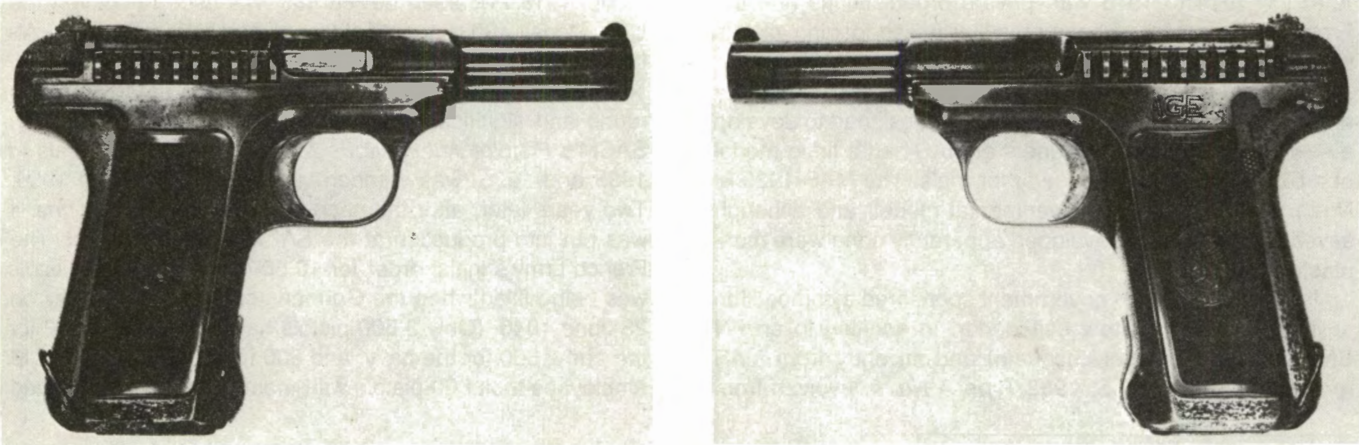


FIGURE 9–3. France acquired about 27,500 of these Model 1917 7.65mm Savage pistols during World War I. This one is serial no. 152,148. *(Mezger)*

to Tulle on 19 June.) The Germans in control of the factory renewed production of the Modèle 1935A calling it the *7.65mm Pistole 625(f)*. During the war, some 40,000 units were procured by the Heereswaffenamt.

In 1937, SACM sold the manufacturing rights for the Modele 1935A pistol to the Schweizerische Industrie Gesellschaft (SIG) in Switzerland. The following year, SIG acquired the rights to sell an improved model of this pistol on the European market. SIG used the Modèle 1935A as the point of departure in the development of what became the *Ordonnanzpistole 49* (P-210), adopted by the Swiss army in 1949.

In 1938 the Manufacture d'Armes de St. Étienne redesigned the Modèle 1935A to make it easier and quicker to manufacture. Although the basic mechanical layout remained unchanged, the external lines became more angular and the locking system simpler. In place of the standard Colt Browning locking lugs on the barrel and locking recesses in the slide, MAS engineers cut a shoulder on the top of the barrel, which was raised up against the forward edge of the ejection port. Called the *Pistolet Automatique Modèle 1935 S,* this pistol was manufactured in four locations and was marked accordingly: Manufacture d'Armes de Tulle (MAT); Société Alsacienne de Constructions Mecaniques (SACM); Manufacture d'Armes de Chatellerault (MAC)—a variant called the *Pistolet Automatique Modèle 35 S M 1* with a different safety—and Société d'Applications Générales Électriques et Mecaniques (SAGEM).

Initial production plans for the Modèle 1935 S called for pistols to be produced at the rate of 5 per hour at MAS. Over

FIGURE 9–4. The French 7.65 × 20mm French Long caliber SACM Modèle 1935 A pistol (serial number H7667A). At 759 grams, this gun measured 196 millimeters with a 110-millimeter barrel (rifling twist, 4-right). Recoil operated, it employed the Colt-Browning method of locking. It used an eight-shot box magazine. *(Krcma)*

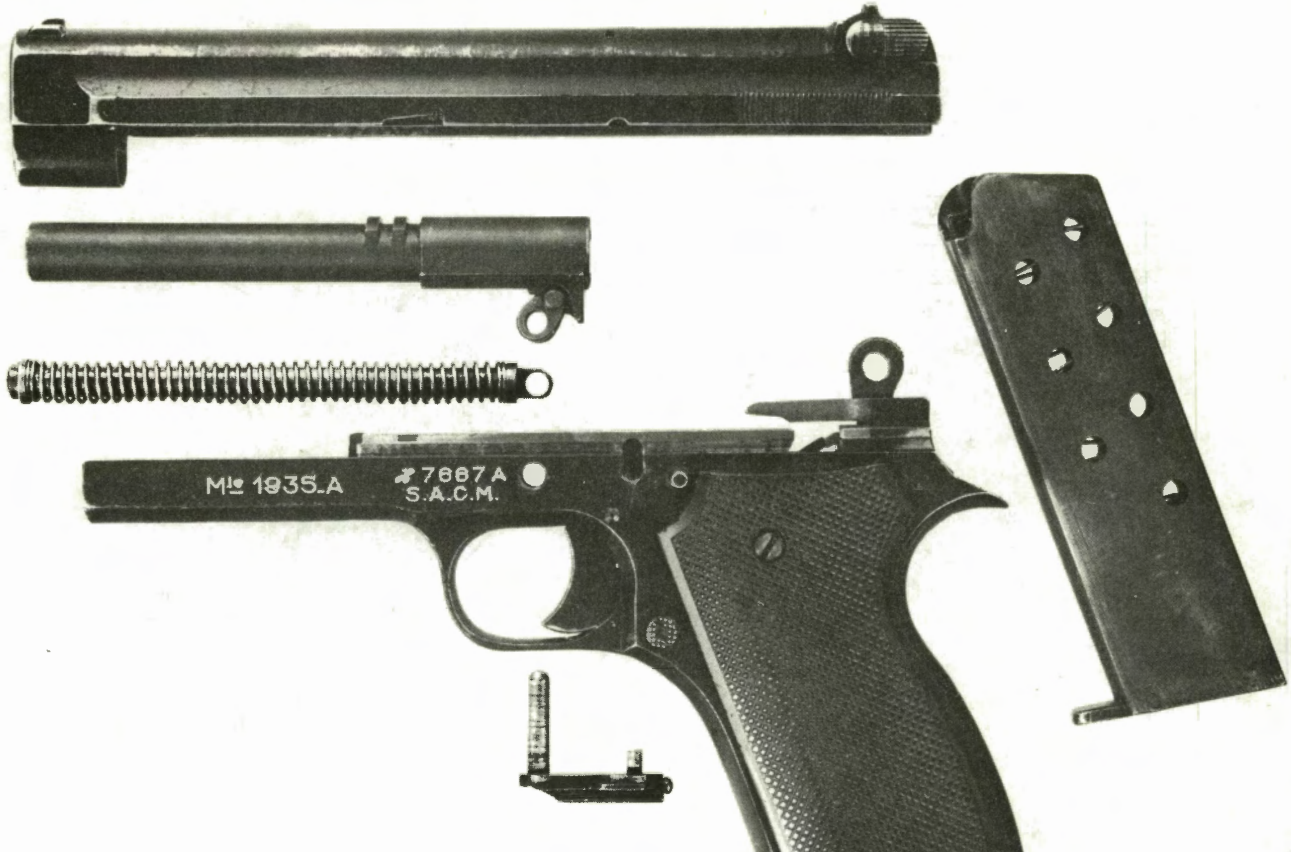

Mle 1935-A
7687 A
S.A.C.M.

PLANCHE V. — **Pistolet automatique, cal. 7,65, mod. 1935/A**

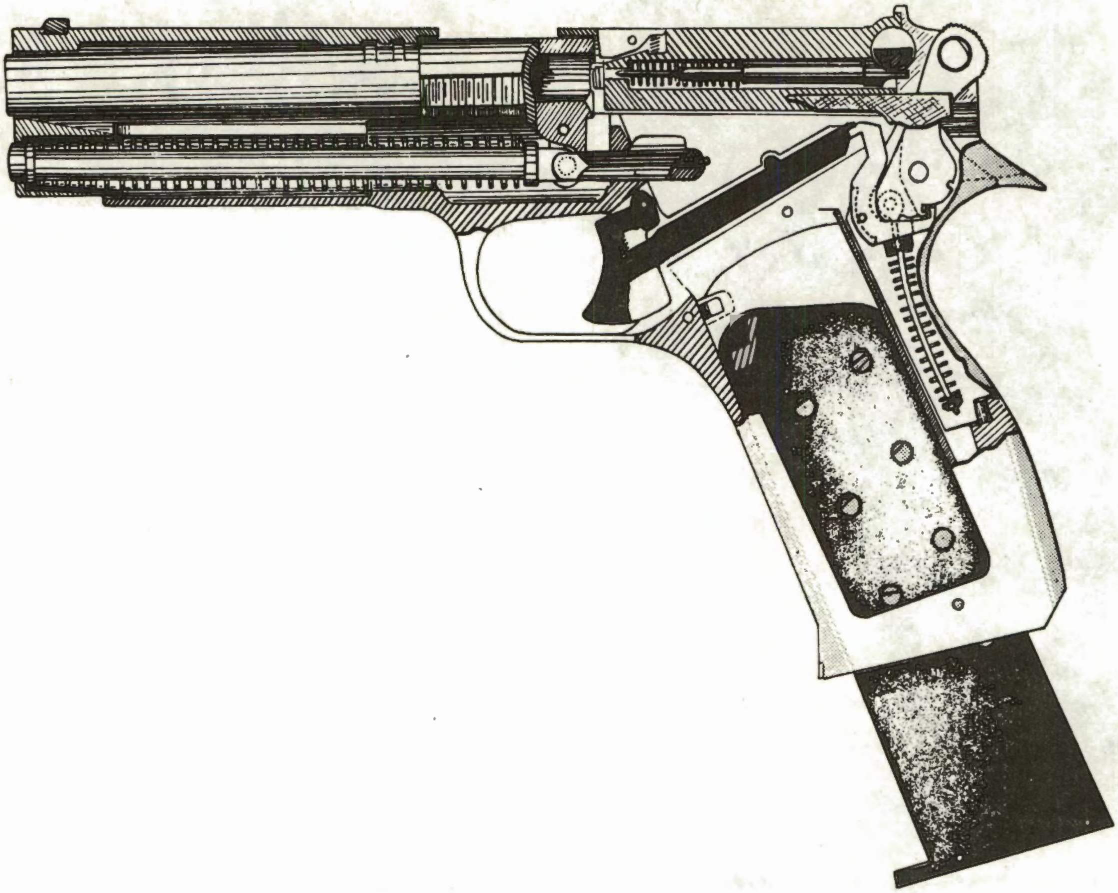


PlANCHE VI. — **Pistolet automatique, cal. 7,65, mod. 1935/A**

FIGURE 9–5. Two sectional views of the French 7.65mm SACM Modèle 1935 A pistol. *(French Government)*

1. Slide
2. Barrel
3. Recoil spring guide
4. Recoil spring guide tip
5. Recoil spring
6. Frame (receiver)
7. Slide stop
8. Trigger pin
9. Magazine catch nut
10. Magazine catch spring
11. Magazine
12. Sear housing/ejector
13. Hammer pin
14. Sear pin
15. Sear pressure plate
16. Hammer spring
17. Hammer strut nut
18. Hammer strut
19. Magazine safety screw
20. Magazine safety
21. Magazine catch
22. Trigger bar/disconnector
23. Sear
24. Trigger bar spring
25. Trigger bar pin
26. Trigger
27. Barrel link
28. Barrel link
29. Barrel link pin
30. Recoil spring guide pin
31. Cartridge indicator pin
32. Hammer
33. Hammer strut pin
34. Firing pin spring
35. Firing pin
36. Extractor spring
37. Extractor
38. Extractor pin
39. Cartridge indicator
40. Cartridge indicator pin
41. Safety catch
42. Grip plate
43. Grip plate screws

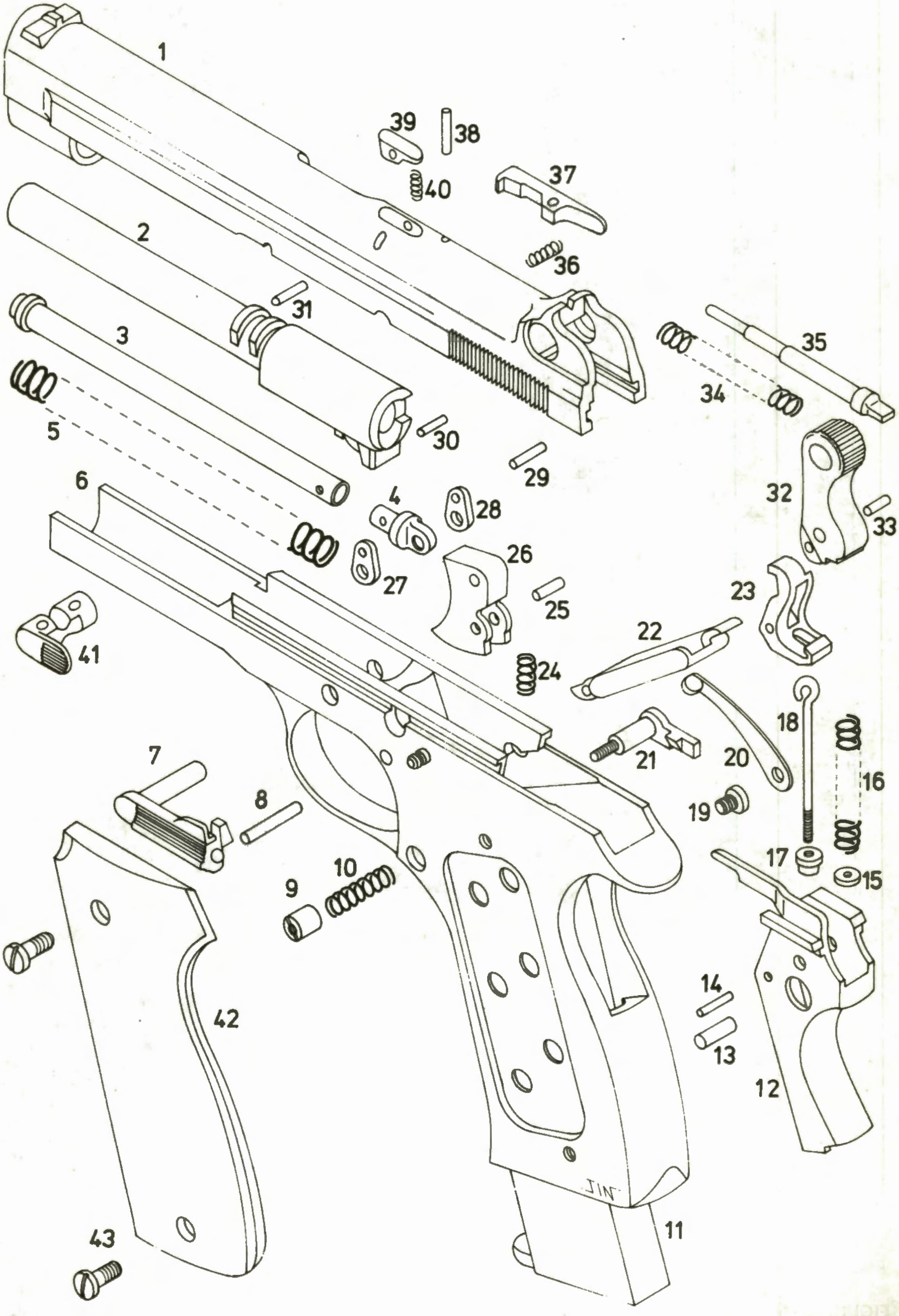


FIGURE 9–6. Exploded view of the French Modele 1935 A pistol. ***(Jimbo)***

FIGURE 9–7. The French 7.65 × 20mm French Long Modèle 1935 S M 1 pistol (serial no. C 1364), built by the Manufacture d'Armes de Chatellerault. At 778 grams, this pistol was 118.5 millimeters long with a 778-millimeter barrel (rifling/twist, 4/R). It was recoil operated with a modified Colt Browning system of locking. It employed an 8-shot box magazine. *(Krcma)*

FIGURE 9–8. Two views of the French 7.65mm Modèle 1935 S, made at the Manufacture d'Armes de Tulle. Note the functioning of the magazine disconnector safety. When the magazine was fully inserted and latched in place, the pistol could be fired. When it was unlatched, the projection on the side of the magazine no longer closed the disconnector safety, and the pistol could not be fired. *(Krcma)*

PLANCHE II. — **Pistolet automatique, cal. 7,65 L., mod. 1935/S**

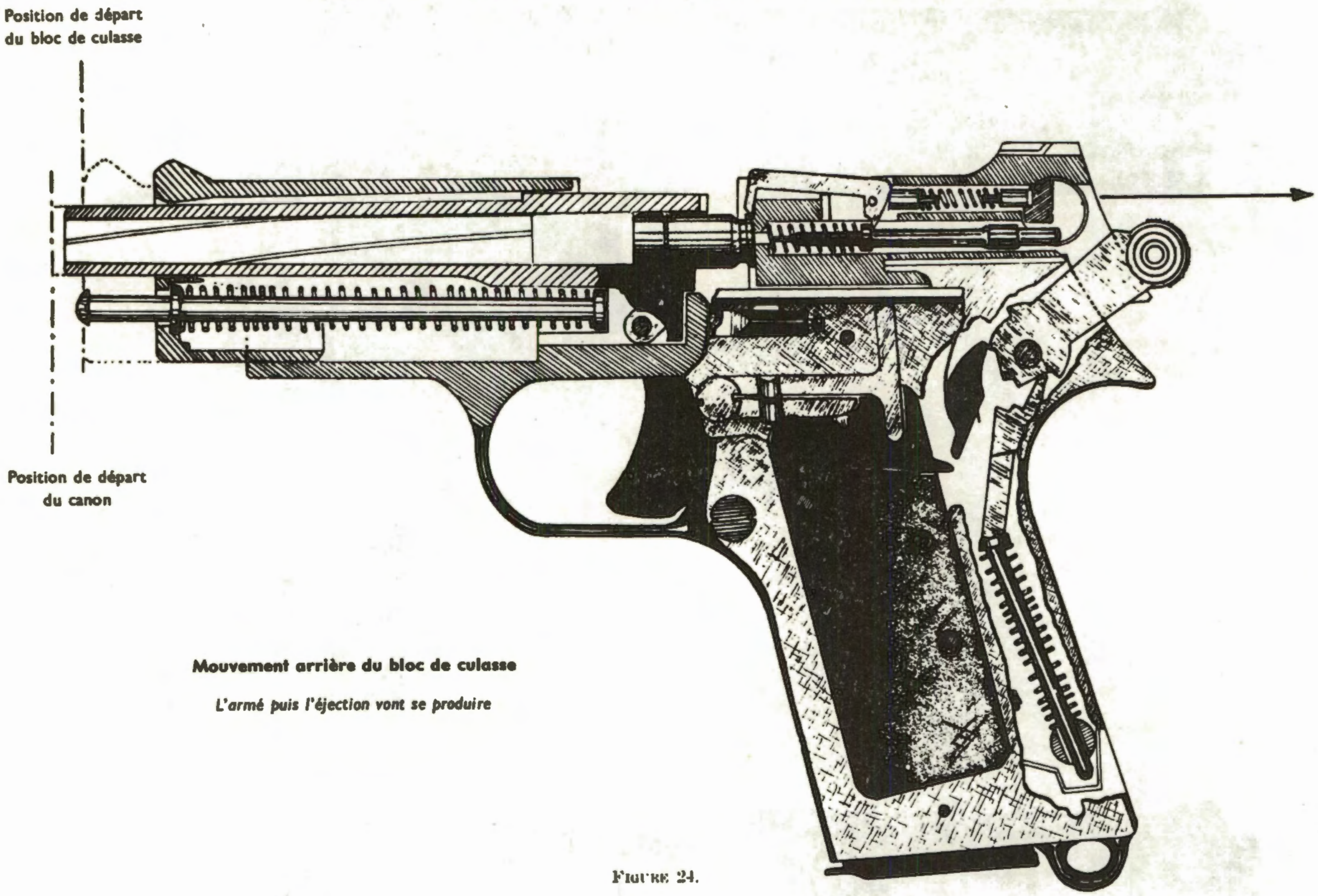


FIGURE 24.

time, this schedule was accelerated to 20 per hour or 3,200 per month. Only 1,404 Modèle 1935 S pistols had been manufactured at St. Étienne by late June 1940 when German troops stormed France. Since no examples of the Modèle 1935 S have been found with German acceptance stamps, it is generally believed that the Heereswaffenamt did not pursue its manufacture, preferring instead the 1935A. Production of both of these pistols was resumed in France after the war until the 9mm Parabellum MAS *Pistolet Automatique Modèle 1950* was introduced. No reliable estimates for the total number of Modèle 1935A and Modèle 1935 S (and S M 1) have been found, but it was probably no greater than 75,000.

It should be noted that Fabrique Nationale also submitted a design in the French pistol trials of 1936. This pistol looked a great deal like the Modèle 1935 Grand Puissance, but it was chambered for 7.65 × 20mm ammunition, and it had a firing mechanism that could be disassembled as a unit. The *en bloc* firing mechanism probably had been required by the French since it is also a feature of the M.A.S. pistols. The Browning Modèle 1936 (fig. 9–11) is one of at least two types known to have been prepared for the French tests. This pistol, of course, lost out to the SACM Modèle 1935A.

There were also several manufacturers whose commercial pistols were used by the French military from time to time. One of these was the Manufacture d'Armes des Pyrénées, located at Hendaye, about 100 kilometers across the Pyrenees mountains from the Basque arms making center of Eibar. When this company started manufacturing pistols in 1923, it not unexpectedly produced an Eibar Ruby-type Browning in 6.35mm and 7.65mm Browning. These pistols, marketed under the *Unique* trademark, came in a number of minor variations.* Introduced in 1923, the 6.35mm pistol was designated the *Modèle 10.* It was followed by the *Modèle 11* (Modèle 10 with grip safety and loaded-chamber indicator),

*In addition to Unique, the Manufacture d'Armes des Pyrénées used a host of other names for the same pistols, depending on the market in which they were to be sold. These included Burgham Superior, Capitan, Cesar, Chantecler, Chimere Renoir, Colonial, Prima, Ranger, Rapid-Maxima, Reina, Demon, Demon Marine, Ebac, Elite, Gallia, Ixor, Le Majestic, St. Hubert, Selecta, Sympathetique, Touiste, Le Sanspariel, Le Tout Acier, Mars, Perfect, Triomphe Française, Unis, and Vindex.

the Modèle 12 (Modèle 10 with grip safety), the Modèle 13 (Modèle 12 with a seven-shot rather than a six-shot magazine), and the Modèle 14 (Modèle 12 with a nine-shot magazine). The Pyrénées firm's basic 7.65mm pistol, the Modèle 15, was also introduced in 1923, followed by the Modèle 16 (Modèle 15 with a seven-shot rather than a six-shot magazine) and the Modèle 17 (Modèle 15 with a nine-shot magazine). Modèles 18, 19, and 20 were 7.65mm versions of the Browning Modèle 1910 pistol made by FN (six-, seven-, and nine-shot magazines respectively). Modèle 21 was a Modèle 19 chambered for 9mm Browning.

On 26 June 1940, German forces entered Hendaye and occupied the Manufacture d'Armes Pyrénées. Occupation authorities continued to produce the Modèle 17 (*Die Selbstlade pistole Unique*), with about 56,000 being made before a slightly modified version with an external hammer was introduced, the *Kriegsmodell* (War Model). The Germans had procured 25,000 Kriegsmodell pistols before the factory was liberated in 1944. After the war, Die Selbstlade pistole Unique Kriegsmodell was produced by the Manufacture d'Armes des Pyrénées as the *Modele Rr 51 Police* in 7.65mm and 9mm Browning.

Another copy of the 7.65mm Eibar-type pistol, the Union, was manufactured by M. Seytres at St. Étienne. In addition to the standard 7-shot model with a 76-millimeter barrel, the Union was also available with a slightly longer barrel and a 35-shot horseshoe-shaped magazine. In the months preceding the Second World War, the French army purchased unspecified quantities of this *Pistol Automatique Union* with the standard barrel and 7-shot magazine.

In Bayonne in 1921, the Manufacture d'Armes Automatiques de Bayonne (MAB) began the manufacture of a 6.35mm pistol patterned after the FN Browning Modèle 1906. A dozen years later, MAB introduced their 7.65mm Modèle C, which was based on the design of the FN Browning Modèle 1910. In September 1933, the Modèle D was added to the product line. It was essentially the same as the Modèle C with a 178-millimeter barrel rather than the standard 155-millimeter barrel. When the Germans occupied France in the summer of 1940, they specifically requested of the Vichy government control over the city of Bayonne. On 26 June, the city was formally taken over, and MAB employees were put to work making handguns for the Heereswaffenamt. From June 1940 through 1942, MAB produced between 51,160

FIGURE 9–10. The hammer-blocking safety of the Modele 1935 S M 1 pistol swung upwards providing both a visual and tactile indication that the safety was engaged. *(Nonte)*

FIGURE 9–11. Two views of the 7.65mm French Long caliber Modèle 1936 Browning-Saive pistol tested by the French in 1936. *(FN)*

FIGURE 9–12. The Manufacture d'Armes des Pyrénées 7.65mm Browning Modèle 17 Unique pistol weighed 785 grams. It measured 155 millimeters overall, with an 81-millimeter barrel (rifling twist 6 left). This recoil-operated handgun used the Browning method of locking and a 9-shot box magazine. *(Krcma)*

FIGURE 9–13. A French government model of the 7.65mm Unique Modèle 17 pistol with the Republic Française monogram on the grips. ***(Krcma)***

FIGURE 9–14. World War II-era German version of the 7.65mm Unique Modèle 17 with grip markings reading "7.65m/m 9 SCHUSS." ***(Krcma)***

FIGURE 9–15. The 7.65mm Unique Kriegsmodell built for the Heereswaffenamt (serial number 59,568). *(Krcma)*

FIGURE 9–16. Postwar 7.65mm Unique "Rr-51 Police" model derived from the World War II Kriegsmodell. *(Unique)*

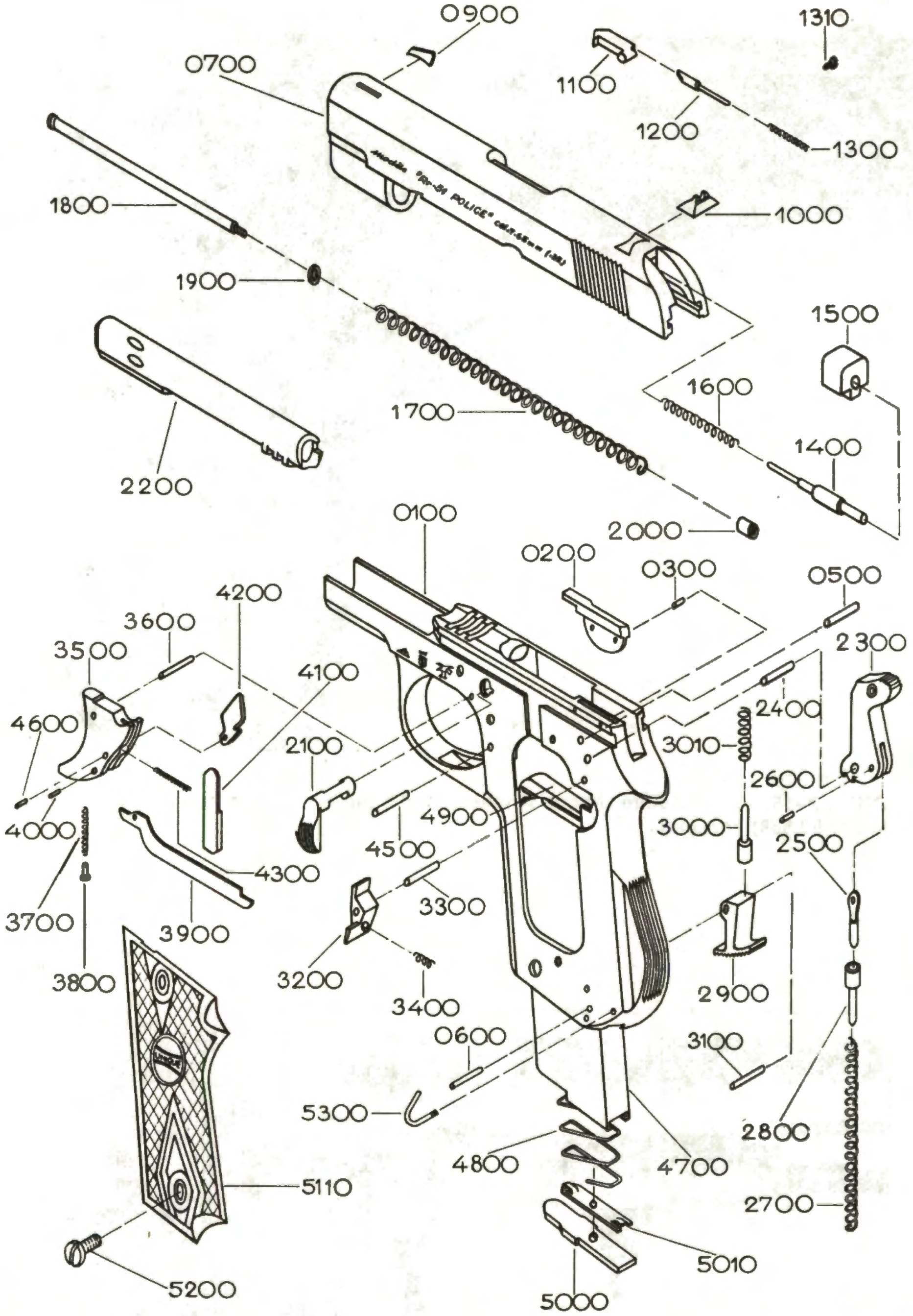


FIGURE 9–17. Exploded view of the Unique Modele "Rr-51 Police," which is nearly identical to the World War II Kriegsmodell. *(Unique)*

0100. Frame
0200. Ejector
0300. Ejector rivets
0500. Hammer stop (slide removed)
0600. Magazine catch stop
0700. Slide
0900. Foresight
1000. Rear sight
1100. Extractor
1200. Extractor piston
1300. Extractor spring
1310. Extractor guide/screw stop
1400. Firing pin
1500. Firing pin stop
1600. Firing pin spring
1700. Recoil spring
1800. Recoil spring guide
1900. Washer for recoil spring guide
2000. Screw nut for recoil spring guide
2100. Safety
2200. Barrel
2300. Hammer
2400. Hammer axis pin
2500. Hammer link
2600. Pin for hammer link
2700. Hammer spring
2800. Hammer spring guide
2900. Magazine catch
3000. Magazine catch guide
3010. Magazine catch spring
3100. Magazine catch pin
3200. Sear
3300. Sear axis pin
3400. Sear spring
3500. Trigger
3600. Trigger axis pin
3700. Trigger bar spring
3800. Trigger bar guide
3900. Trigger bar
4000. Trigger bar pin
4100. Disconnector
4200. Magazine safety
4300. Magazine safety spring
4500. Magazine safety stop
4600. Magazine safety pin
4700. Magazine case
4800. Magazine spring
4900. Magazine platform
5000. Magazine bottom plate
5010. Magazine spring bottom plate
5100. Handle plate, right hand
5110. Handle, plate left hand
5200. Handle plate screw
5300. Lanyard ring

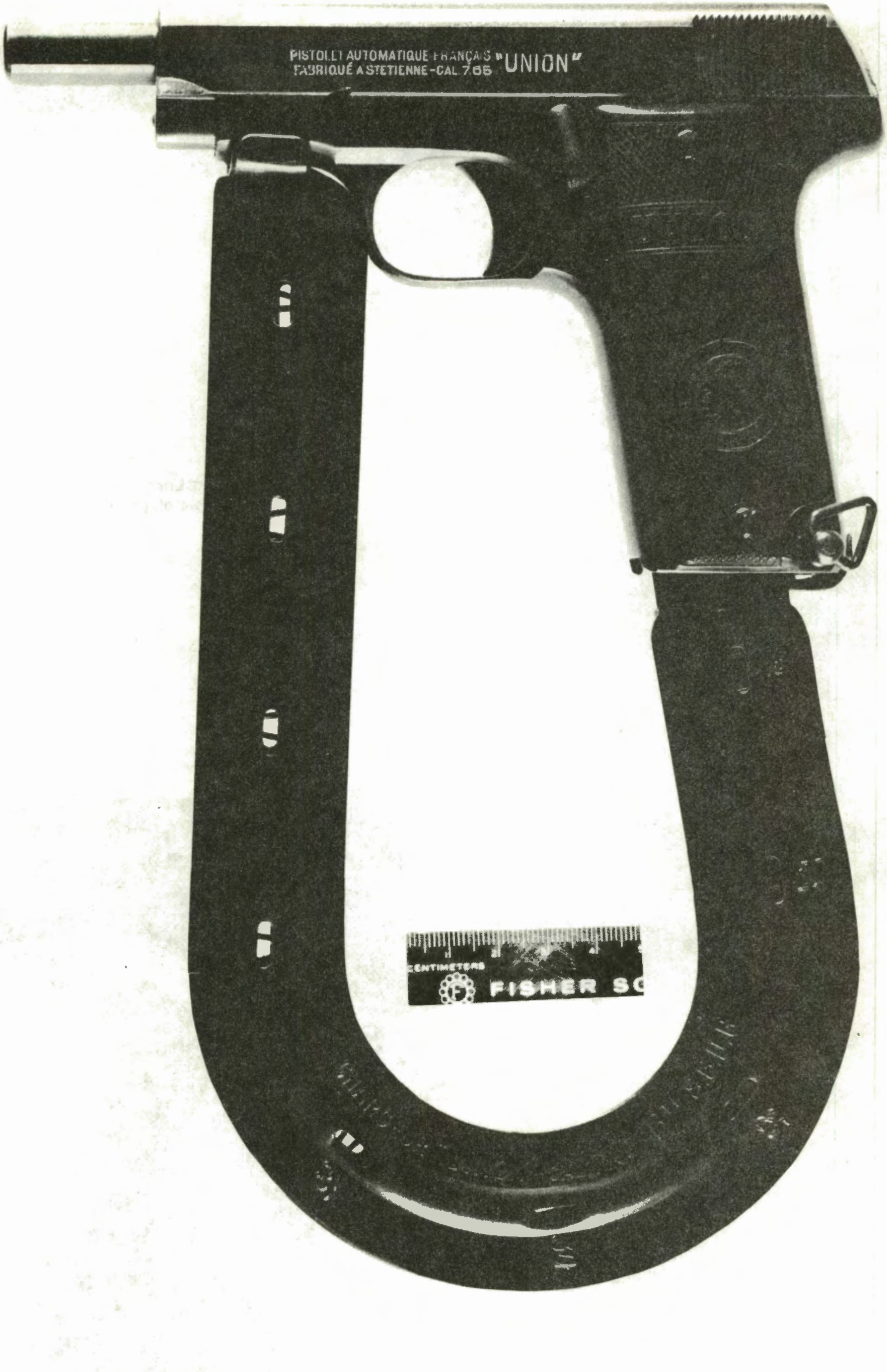


FIGURE 9–18. The 7.65mm Pistolet Automatique Union with the special 35-shot magazine. This is pistol number 10. ***(Krcma)***

FIGURE 9–19. The 9mm Browning Long caliber Manufrance Modèle 1928 Militar "Le Francais" pistol. *(Krcma)*

FIGURE 9–20. The 1928 Model "Le Francais" pistol with the grip removed to show the lever connecting the recoil spring to the slide. *(Krcma)*

and 54,000 Modèle Ds for the Germans, who called it the *Pistole MAB Kaliber 7.65mm.* By the end of the war, MAB had produced a total of about 300,000 pistols (1921–1945).

In 1913, the Manufacture Française d'Armes et Cycles de St. Etienne—Manufrance—entered the handgun business with yet another 6.35mm pocket model. But their pistol stood out. Designed by M. Mimard, the Le Français blowback pistol depended upon the mass of its parts and a recoil spring to absorb the recoil force. Its barrel was hinged to the frame so that it could be tipped open either by using the lever on the right side of the pistol or by removing the magazine (see chapter 4). Other interesting features were the long slide (to provide adequate mass and good bearing surfaces), the double-action striker firing pin mechanism, and the unique recoil spring mechanism. The recoil spring, a heavy coil spring, was housed in a vertical tunnel cut in the frame in front of the magazine. A flat lever connected the recoil spring and the slide. When the slide recoiled, the lever compressed the recoil spring. Manufrance produced about 215,000 6.35mm, 10,000 7.65mm, and 4,000 9mm Browning Long Model pistols before production was terminated in 1938.

Pistol and revolver manufacture was not a particularly large-scale business in France before World War II. Of the million or so pistols produced in France between 1920 and 1945, approximately 175,000, about 17.5 percent, were built for the Germans during the war. In the postwar years, the French used the 9mm Parabellum P 38 and the 9mm Parabellum MAS 1950 model, similar to the Modèle 1935A. Both were later replaced with the MAB 9mm Parabellum Pistolet Automatique 15 (15-shot), which is currently (1980) the pistol carried by the French army.

NOTES

This chapter was based on the following sources:

Ferrard, Stephane. *L'Armement de l'Infanterie Française, 1918–1940.* (Paris: Argout Éditions, 1979), pp. 37–41.

Hogg, Ian V., and Weeks, John. *Pistols of the World* (London: Arms and Armour Press, Ltd., 1978), pp. 108–10, 157–59, 183–86.

Mathews, J. Howard. *Firearms Identification,* vol. I, *The Laboratory Examinations of Small Arms, Rifling Characteristics in Handguns, and Notes on Automatic Pistols* (Springfield, IL: Charles C. Thomas, Publisher, 1962), pp. 195–99, 218–22, 224–26, 287–94.

Whittington, Robert D. III. *German Pistols and Holsters, 1934/1945: Military, Police, NSDAP.* (Dallas: Brownlee Books, 1969), pp. 116–18, 134–42.

10 ITALIAN HANDGUNS 1900 to 1938

In the final decades of the nineteenth century, the handgun manufacturing industry in Italy was concentrated in the Val Trompia, a 40-kilometer-long valley on the upper Mella River that stretches northward from Bresica, the capital of the province of the same name. The major handgun manufacturers included Fabbrica d'Armi Pietro Beretta, Val Trompia; Fabbrica d'Armi Castelli, Bresica; Siderugica Glisenti, Societa Anonima, Carcina Val Trompia; and Fabbrica Nazionale d'Armi, Bresica. In Italy, Beretta and Glisenti pioneered the move toward self-loading handguns.

SIDERUGICA GLISENTI AND THE GLISENTI PISTOL

Francesco Glisenti established a company in 1859 at Conca di Creto to manufacture steel and steel products. By 1870 a small department within Siderugica Glisenti was making firearms. The first military handgun produced by Glisenti was the 10.35mm Modello 1872 revolver, which had been adopted by the government for issue to Customs Guards, artillery officers, and select government officials. Four years after Francesco Glisenti's death in 1887, the company began to manufacture the *Pistola a Rotazione, System Bodeo Modello 1889,* a new Italian service revolver. After the turn of the century, the firm was incorporated and renamed Siderugica Glisenti, S.A., and the factory was moved to Carcina Val Trompia.

At its new location, Siderugica Glisenti embarked upon a new venture—the building of a self-loading pistol, the "Glisenti" pistol. This design, patented in June 1905, was the work of Bethel Abiel Revelli, an Italian army officer.[1] There is some debate over the origin of the Revelli-Glisenti mechanism. The late R. K. Wilson argued that it bore remarkable mechanical similarity to a 1905 design by two Swiss nationals living in Belgium, Paul Hausler and Pierre Roch; but it is also possible that Revelli's design was independent of the work of those two men.[2] On 17 March 1906, Siderugica Glisenti signed a contract with the British machine tool manufacturers Greenwood & Batley Ltd. of Leeds for the production machinery necessary for fabricating the key components of this pistol.

A United States War Department intelligence document published in 1903 cited an account of self-loading pistol trials that appeared in the 6–7 March 1902 issue of *L'Italia militare e marina.* According to the report, a small arms committee at Parma had tested a new pistol that was about to be adopted for officers of the Italian army: it would fire a smaller projectile than their 10.35mm revolver and use smokeless propellant—this was the new Glisenti.[3] Glisenti began manufacturing its 7.65mm self-loader later that year, and the government issued them to Carabinieri officers.

A little more than a year later, in 1903, another Italian firm, Metallurgica Bresciana gia Tempini (MBT) signed a contract with Greenwood & Batley for equipment to produce fourteen different parts for the Revelli design, the Glisenti firm having sold its license to manufacture the pistol to MBT. Glisenti also gave MBT the right to put its name on the weapons they produced, so after 1907 the Glisenti name could not be considered as an indication of manufacturer but as a model designation. During the summer and fall of 1908, Metallurgica Bresciana and Greenwood & Batley went through an extended controversy about the quality of the barrel-making machinery supplied to the pistol maker. Whereas the Glisenti firm had had its own barrel-making equipment, MBT had to acquire the necessary machines from a machine tool manufacturer. To make 100 barrels per 10-hour work day, the company needed two horizontal milling machines, two vertical milling machines, two taper turning machines, two capstan lathes for boring and reaming the rough-finish barrels, one barrel straightening machine, one lapping machine for polishing the interior of the barrels, one double-acting special rifling machine capable of rifling two barrels at a time, and one set of working gauges, checking gauges, and jigs. Unfortunately for Greenwood & Batley, Metallurgica Bresciana had a great deal of trouble with their barrel-making machinery.

FIGURE 10–1. Bethel Abiel Revelli, the designer of the Glisenti self-loading pistols. *(Chinn)*

FIGURE 10–2. **The 9 × 19mm Glisenti 1910 self-loading pistol adopted by the Italian army as the *Pistola Italiana Modello 1910, calibro mm.9.* With a 95-millimeter barrel, the 1910's total length was 220 millimeters (rifling twist 6-right). Empty it weighed 860 grams. This locked-breech weapon had a locking wedge and utilized an 8-shot box magazine. *(Visser)***

The English firm, not having received steel samples from the arms maker ahead of time, had not been able to properly calibrate the machines before they left Leeds. Mr. Schmidt, who represented Greenwood & Batley during the machinery set-up at the Italian factory, ran into several problems right away when it became obvious that the equipment would have to be readjusted. Schmidt was frustrated in his efforts by the manager of Metallurgica Bresciana, a Mr. Lehmann, who argued that the Greenwood & Batley machinery was of an obsolete design and that he had encountered no difficulties when making barrels on Deutsche Waffen-und Munitionsfabriken (DWM) equipment.[4] When Metallurgica Bresciana replaced several of the Greenwood & Batley machines with ones from DWM, the British firm wrote to their agent in Milan: "We are not surprised that the new German management [Lehmann] have placed orders in Germany for as many machines as they possibly could, and condemned the English machine as that is their usual policy in all cases."[5]

The Glisenti firm initially produced their pistol—called the Model 1906 by the Italian military—in 7.65 × 22mm. This cartridge was quite similar to the 7.65mm Parabellum cartridge (the shoulder of the bottleneck was closer to the mouth in the Glisenti cartridge), but it was loaded with a lighter powder charge to reduce the recoil. Just how many Model 1906 pistols were produced is unclear, but the number was probably small as specimens of the 7.65mm Glisenti are extremely rare. It would also appear that both Metallurgica Bresciana and Glisenti had government contracts for the Model 1906. On 4 August 1908, Ing Ricci, the technical manager at Glisenti, told the Greenwood & Batley representative in Italy that he feared that MBT would not be able to complete their government order for the pistols, in which case the government might terminate all contracts for the pistol and possibly manufacture it in a state factory.[6] As it worked out, MBT was able to solve its problems and produce the self-loader to the government's satisfaction.

In 1910, the Italian army adopted a 9mm version of the Glisenti as the *Pistola Italiana Mod. 1910, calibro mm. 9.* Dimensionally the same as the 9 × 19mm Parabellum cartridge, the new Glisenti round had a reduced charge, which produced a muzzle velocity of 285 to 290 meters per second, as compared to the 320 to 350 meters per second of the 9mm Parabellum. The lower-powered cartridge was dictated by the design of the weapon, but it was still a relatively powerful cartridge for a blowback pistol.

Handgun authorities are in unanimous agreement that the Glisenti is a "unique weapon," but in this instance "unique" carries a negative connotation. R. K. Wilson noted: "The Glisenti is one of the most curious pistols made. It is certainly unique amongst military pistols in its construction and action."[7] Designer Revelli had used the same basic principle for the locking mechanism in this pistol as he had in his 1914 Revelli-Fiat light machine gun, which made it a hybrid between a locked-breech and a retarded blowback weapon. The lock consisted of a pivoting wedge mounted into the frame that engaged a locking recess in the bottom of the bolt. This bolt reciprocated in the barrel extension, which moved along rails in the frame. Upon firing, the barrel and bolt recoiled together for a distance of about seven millimeters until the pivoting wedge was released. The barrel stopped its rearward travel, while the bolt continued its movement to the rear. The depressed locking wedge held the barrel in its recoil position. On the return cycle, the bolt stripped a fresh cartridge from the magazine, the wedge rose to lock the bolt to the barrel assembly, and this action in turn freed the barrel for a forward travel. The energy for the forward stroke of the

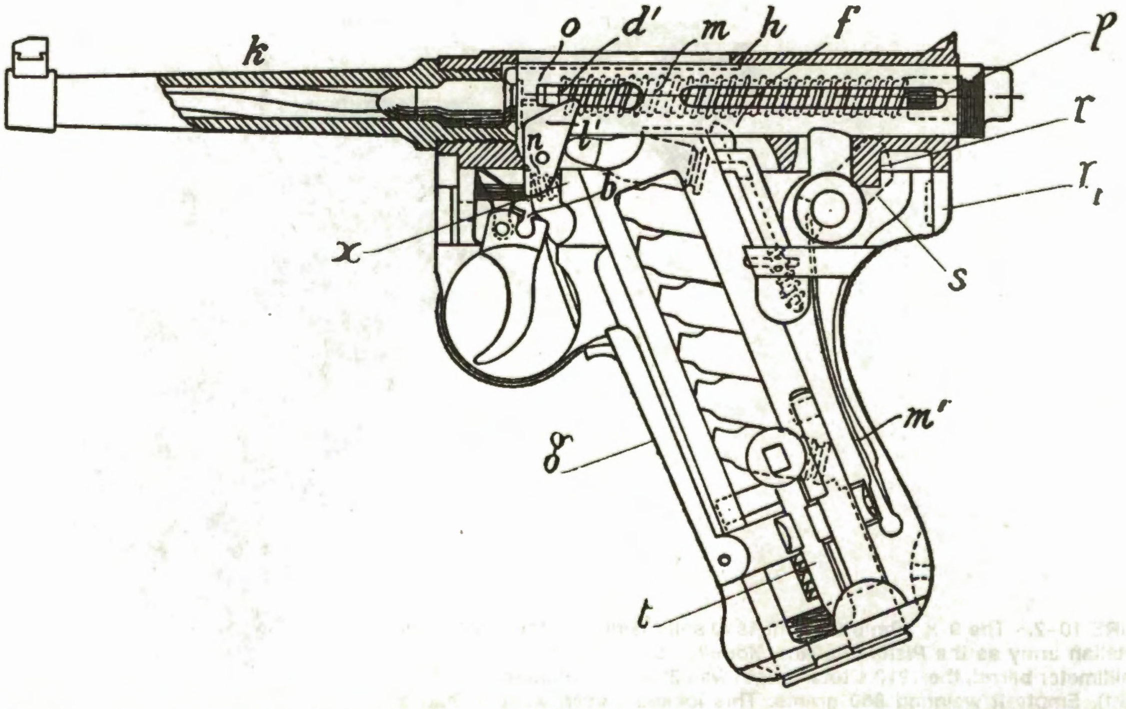


FIGURE 10–3. Section view of the Italian Glisenti pistol. Note the hesitation lock as indicated by the letter *S.* *(Wilson)*

FIGURE 10–4. The 9mm Model 1912 Brixia pistol. Note the MBT monogram on the grip. ***(Visser)***

barrel was provided by a return spring. Although the barrel did have a definitive locked phase (thus qualifying the weapon as a locked-breech pistol), the rapidity of the action made it appear to function as a retarded blowback design.

In the Glisenti pistol, the barrel and barrel extension were machined from a single block of steel. The interior of the barrel extension had a square-shaped cross section that corresponded with that of the bolt. At the breech end of the barrel, the extension was cut away to permit cartridge loading and ejection. Slots were provided front and rear to accommodate the locking wedge, with the front one locking the barrel in its recoil position and the rear one allowing the locking wedge to hold the bolt closed. The barrel extension also had a longitudinal groove on either side that provided a bearing surface for the rails machined into the frame. The right-hand groove engaged the rail on the solid part of the frame, while the left-hand one mated to the rail that was part of the detachable side plate.

The removable side plate was the pistol's great structural weakness. It made disassembly easier, but at the expense of strength. Wilson commented on this aspect of the Revelli design: "It will be realized that this is an undesirable arrangement, because it means that the barrel is only very weakly supported in the action body [frame], as its left hand bearing is simply the cover plate which, while held behind by a hook fitting into a recess on the more rigid part of the [frame], in front it is supported only by a small screw." Considering the relatively powerful 9mm ammunition used in the Glisenti, there was an inherent tendency for the side plate to loosen after periods of long use.[3]

The Model 1910 Glisenti was produced throughout the 1920s, although after 1916 a new automatic pistol made by Beretta began to replace it in the field. On the commercial market, Metallurgica Bresciana introduced an improved and somewhat simplified version of the Model 1910 called the *Brixia,* Latin for Brescia. This handgun was slightly stronger than the standard Model 1910, in that the side plate was altered, and it did not have a grip safety. A small quantity of Brixias, sometimes referred to as Model 1912s, were purchased by the Italian army for extended trial in 1912. The coming of the war in 1914 brought an end to the gun's commercial production.

Testing in the United States

In the summer of 1906, the "parties" who controlled the Glisenti pistol patent contacted Major Frank A. Edwards, U.S. Military Attache at the American Embassy in Rome, and asked him to present a series of questions to the U.S. Ordnance authorities. These unspecified parties—presumably the management at Siderugica Glisenti—proposed to develope a .45 caliber (11.43mm) version of the Glisenti for upcoming American pistol trials. Specifically, they wanted to know if a seven-cartridge magazine could be used instead of an eight-cartridge one because eight of the larger .45 caliber cartridges would add to the length of the pistol grip. And what length barrel did American officials prefer? Was the grip safety feature of the Glisenti a necessity for United States military purposes? Could the United States government provide them with 400 cartridges for the development of a prototype? And finally, the managers of the Italian firm wondered if they had time to develop a .45 caliber weapon before the trials took place in America. The Italians suggested that it would take three months from receipt of the cartridges to have a firing model ready. Originally the United States trials were scheduled to start on 29 October 1906, which left the Italians with insufficient time to ready the new caliber Glisenti pistol. Even though this set of trials was subsequently postponed the Americans never received a .45 caliber Glisenti for their evaluation.[9]

Italian small arms designer Colonel Giuseppe Vitali (1845–1921) proposed creating a .45 caliber version of his self-loading pistol in the spring of 1906. And four years later, Major Cei Rigotti, another designer, told Major J. F. Reynold Landis, American Military Attache at Rome in 1910, that he would send his 8mm pistol with 1,000 rounds of ammunition to the United States for military testing. However, neither of these men, better known for their work with rifles, actually submitted pistols to U.S. Ordnance officials.* But the 9mm Glisenti was tested twice by the American, in 1910 and again in 1912.

The 9mm Glisenti examined at Springfield Armory on 23 January 1912 performed marginally when subjected to the standard testing program for self-loaders. Negative points described in the test report included difficulties in loading the

*Vitali is best remembered for his conversion of the Swiss Vetterli single-shot rifle to a repeater, which was called the Italian Vetterli-Vitali Rifle of 1887. Cei Rigotti developed a self-loading rifle shortly after the turn of the century.

TABLE 10-1 COMPARATIVE DATA FOR PARABELLUM AND GLISENTI AMMUNITION

	7.65 Glisenti	*7.65 Parabellum*	*9mm Glisenti*	*9mm Parabellum*
Bullet diameter (mm)	7.77–7.83	7.70–7.9	8.95–9	8.9–9.05
Case diameter (mm)				
Neck	8.32–8.34	8.25–8.45	9.60–9.65	9.5–9.68
Head	9.83–10	9.8–10	9.85–9.9	9.78–10
Rim	9.9–11	9.85–10	9.9–9.95	9.82–10
Case length (mm)	21.5–22.1	21.32–21.6	18.9–19.	18.8–19.2
Cartridge length (mm)	28.7–29.7	23.7–30.15	28.9–29.	28.9–28.95
Velocity (meters/sec) (at the muzzle)	335	368	285–290	345*

*At 12.5 meters.

FIGURE 10–5. The 7.65mm Browning caliber Modello 1915 Beretta pistol (serial number 36,617). This blowback pistol measured 150 millimeters overall, with an 85-millimeter barrel (rifling twist 6-right). It weighed 562 grams and was issued with an 8-shot box magazine. *(Mezger)*

pistol, low projectile velocity (279 meters per second at 7.62 meters), and failure to function after the rest test. The Glisenti did function with both decreased charges (10 percent less powder) and excessive charges (25 percent more powder) without damage to the gun. Only one of the two pistols sent from Italy was test-fired because one had a flawed barrel. (The imperfect pistol was used for spare parts when the ejector and grips broke on the functioning pistol.) Predictably, the test board decided that the Glisenti was not satisfactory for adoption as a military pistol, "its caliber and reliability not being sufficiently great."[10]

BERETTA HANDGUNS

Fabrica d'Armi Pietro Beretta traces its roots to the year 1680 when gunmaker Pietro Beretta established his workshop in the town of Gardone in the Val Trompia.[11] In 1903, 223 years later, another Pietro Beretta assumed control of the family business and began to modernize the workshops so that newer designs could be manufactured more efficiently. One of the early additions to Beretta's staff was arms designer Tullio Marengoni. Together, Beretta and Marengoni built the Beretta firm into one of Italy's major firearms producers.

Modello 1915

By 1914, Italian ordnance officials were seeking a replacement for the Glisenti pistol, and Beretta and his designer were ready with the *Beretta Modello 1915* pistol, which they were prepared to make in either 7.65mm Browning or 9mm Glisenti. The Modello 1915 was a blowback design with fixed barrel and a concealed hammer. In the Glisenti caliber, the designers provided the handgun with a heavy slide, strong recoil spring, and stiff buffer spring in the frame to strengthen it. The simple trigger-sear mechanism of the Modello 1915 was carried over into later Beretta pistols. In this design the trigger bar had a slip-off contact with the sear, thus eliminating the need for a disconnector. After each shot, the trigger had to be released before the pistol could be fired again. In the interest of simplicity, the slide latch also served as one of the two safety latches. The self-contained recoil spring assembly remained with the frame assembly when the pistol was disassembled. Take-down was also simple. After removing the magazine, the forward safety lever was used to lock the slide open. The barrel could then be lifted out of the frame, the latch released, and the slide moved forward off the frame.

There were a few minor differences between the 7.65mm and 9mm models of the Modello 1915. One was the positioning of the screw that held the grip plates. A more significant difference however was the means of cartridge ejection.

FIGURE 10–6. The 9mm Glisenti caliber Modello 1915. ***(Beretta)***

In the 7.65mm model, a vertical projection on the frame contacted the firing pin in such a way as to cause that pin to protrude through the face of the bolt and thereby act as an ejector. The 9mm version had a separate ejector and a second safety at the rear of the slide that directly blocked movement of the hammer. The 9mm model weighed about 880 grams, approximately 300 grams more than the 7.65mm. Both types were used by the Italians during the First World War, those marked "PS" (*Publica Sicurezza*) being carried by the police and those marked "RE" (*Regio Esercito*) by army personnel.

Modello 1915/19

The *Modello 1915/19* was the much-modified version of the Modello 1915 developed in 1919. Production began in 1922, at which time manufacture of the 1915 was terminated. In the Modello 1915/19, the small top ejection port was eliminated; the top of the slide was open from just behind the front sight all the way back to the extractor. This open-top slide was henceforth an identifying feature of Beretta pistols. The 1915/19 self-loader had a modified safety take-down catch and sheet-metal grips instead of wooden ones. Its barrel had to be pushed slightly to the rear before it could be removed. Used by the Italian army, navy, air force, and police, it was produced until 1931.

Modello 1923

Introduced in 1923, the *Modello 1923* was the last Beretta design to be chambered for the 9mm Glisenti cartridge and the first to have an external hammer. This new version of an established idea had a positive disconnector, which was an integral part of the trigger bar, and its grips were made of pressed sheet metal. As with the Modello 1915, this 9mm handgun had a buffer to slow the movement of the slide. In the Modello 1923, this buffer was made of a fiber composition instead of being a spring. Only about 3,000 of this model were manufactured, and most of these were sold to the Italian military. A small quantity went to Argentina, where they were purchased by the Polica de la Provincia de Buenos Aires and were so marked.

Modello 1931

In 1931, designer Marengoni combined the best features of the Modello 1915/19 and the Modello 1923 into a pistol made for the Italian navy. This 7.65mm Browning pistol had wooden grips with a metal plate carrying an anchor and the markings "RM" (*Regio Marina*). With the exception of the caliber, the grips, and the shape of the frame, the *Modello 1931* was identical to Beretta's most famous pistol, the Modello 1934.

Modello 1934

The *Modello 1934* is the pistol that is generally associated with the Beretta name and with the Italian army of World War II. It was chambered for the 9mm Browning (9mm Corto or .380 ACP) cartridge and borrowed the best features from the earlier Beretta-Marengoni pistols. The back strap of the frame was reshaped to make it more comfortable in the user's hand, and the pistol was built ruggedly—most parts were actually heavier than they needed to be—so it could withstand the rigors of military service. (For example, the plastic grips had a sheet-metal backing for reinforcement.) A 7.65mm Browning caliber version was also made and designated the *Modello 1935*. Common property stamps are "RE" (*Regio Escercito*), "RM" (*Regio Marina*), "RA" (*Regio Aeronautica*), and "AM" (*Aeronautica Militare*). The 7.65mm Modello 1935 was most commonly issued to air force and naval personnel and carried their markings.

OTHER ITALIAN HANDGUNS

Two other Italian handguns—experimental nonserial production models—are worth noting. They were designed by Alfred Scotti and Giulio Sosso. In the early 1930s, Scotti, another Bresican arms maker and better known for his machine guns, proposed a gas-operated 9mm Parabellum with a rotary locking barrel similar in concept to the Steyr Model 1911 (chapter 7) and the Nickl (chapter 14). Although it never advanced beyond the paper stage, it was quite streamlined in appearance and was designed to be cocked with one hand. Sosso's 9mm Parabellum was built by Fabbrica Nazionale d'Armi of Bresica during World War II. It is of interest because of its chain-feed system housed in the pistol grip, which held 20 rounds.

Beretta and Glisenti, by being the first firms in Italy to experiment with self-loading military handguns, ensured themselves prominent places in the twentieth century world of small arms. Of these two, Beretta's handguns were manufactured in greater numbers (unfortunately no accurate production figures are available) and were improved more over time to meet the Italian armed forces' changing needs.

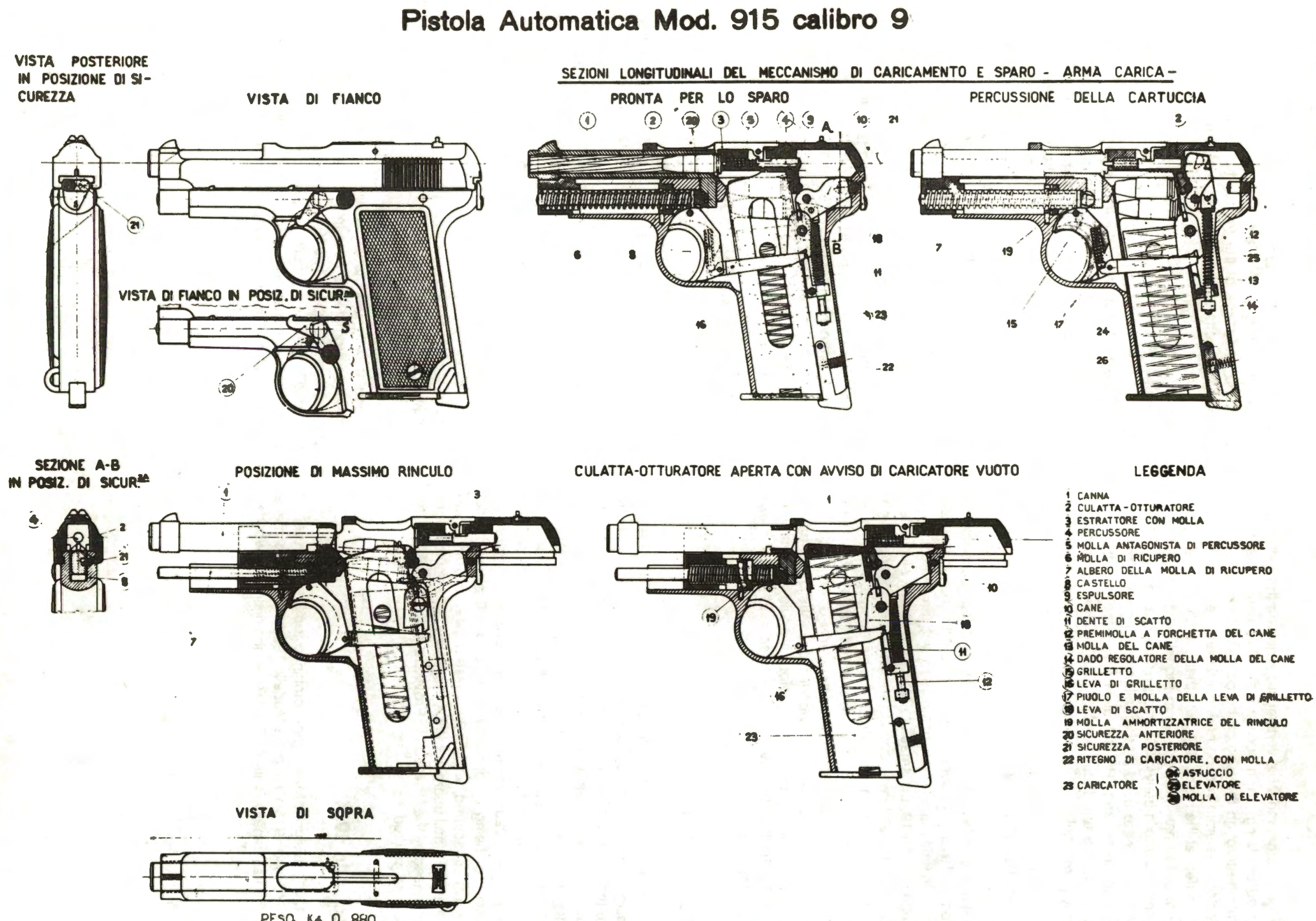


FIGURE 10–7. Sectional views of the Beretta Modello 1915 pistol. *(Beretta)*

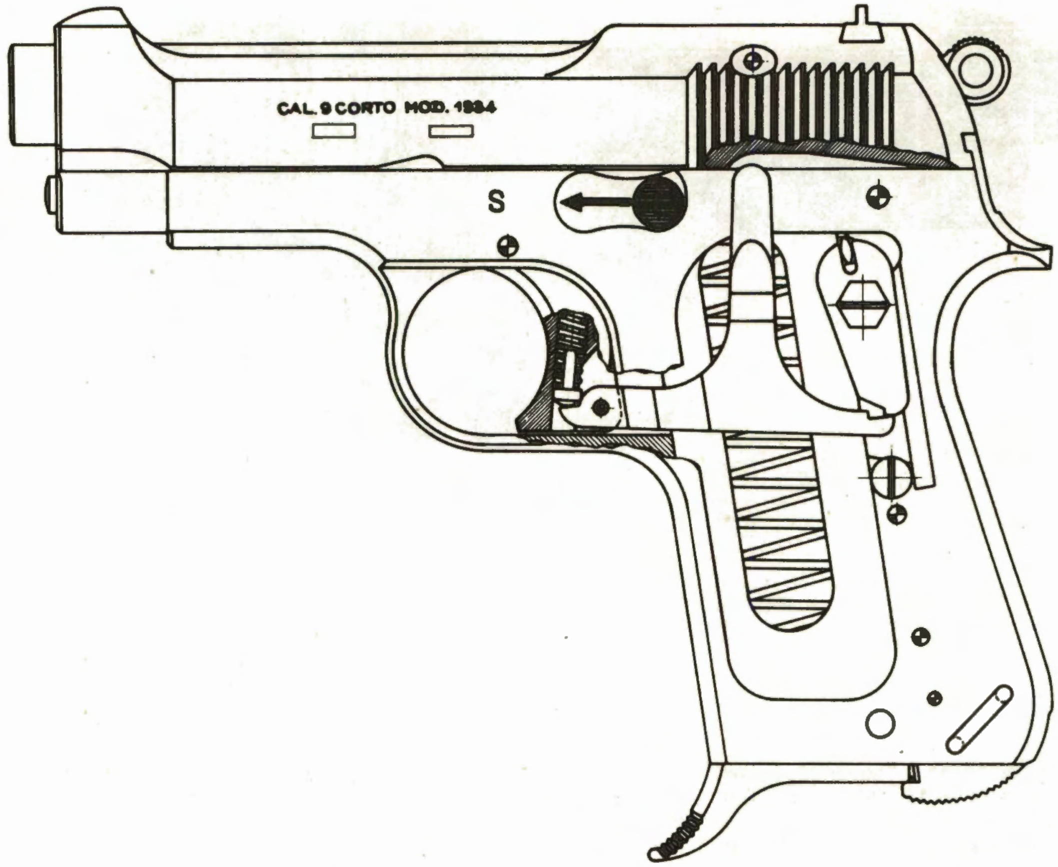
FIGURE 10–8. The Beretta 7.65mm 1915/19 pistol (serial number 213,931). *(Krcma)*

FIGURE 10–9. The 9mm Beretta Modello 1923 pistol with special holster-stock. *(Beretta)*

FIGURE 10–10. The Beretta factory during the World War II era. *(Beretta)*

FIGURE 10–11. The 9mm Browning Beretta Modello 1934 pistol built in 1938 (year XVI of the Fascist era). The "RE" marking on the grip tang below the hammer stands for *Regio Escercito*, Royal Army. *(U.S. Army)*

FIGURE 10–12. The 7.65mm Browning Beretta Modello 1935, built in 1944. *(Tokoi)*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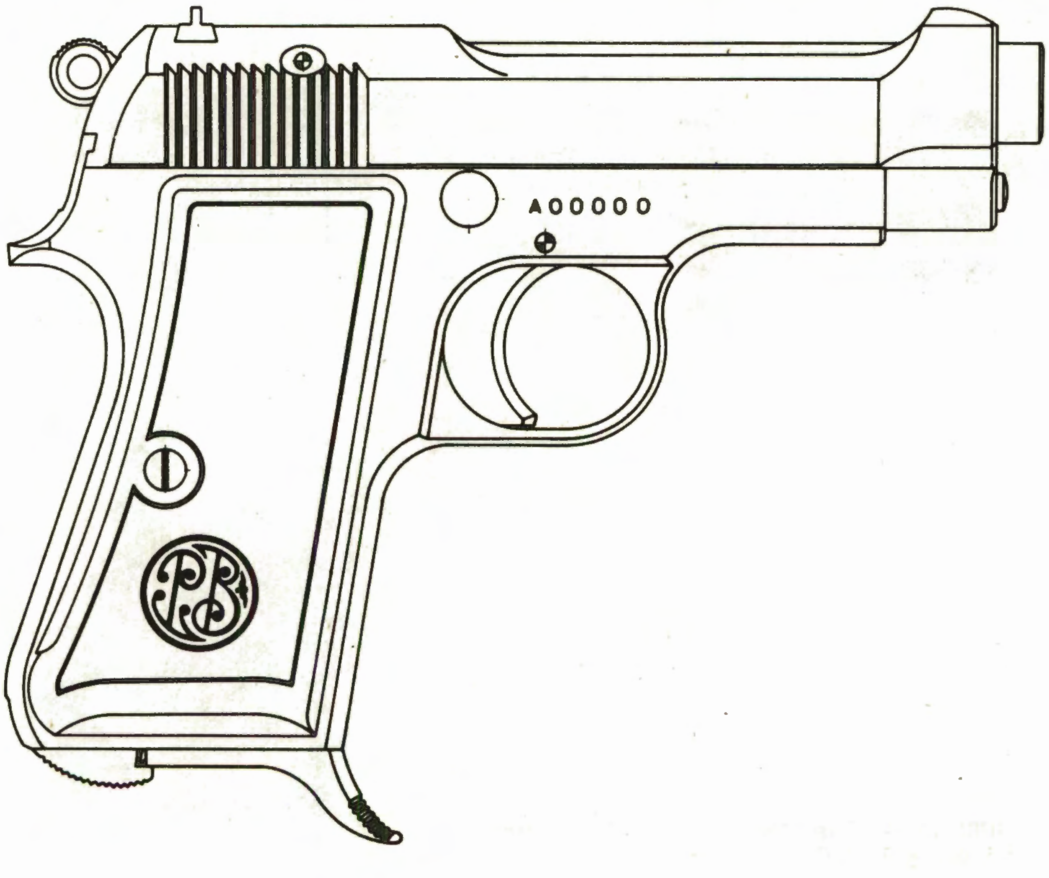
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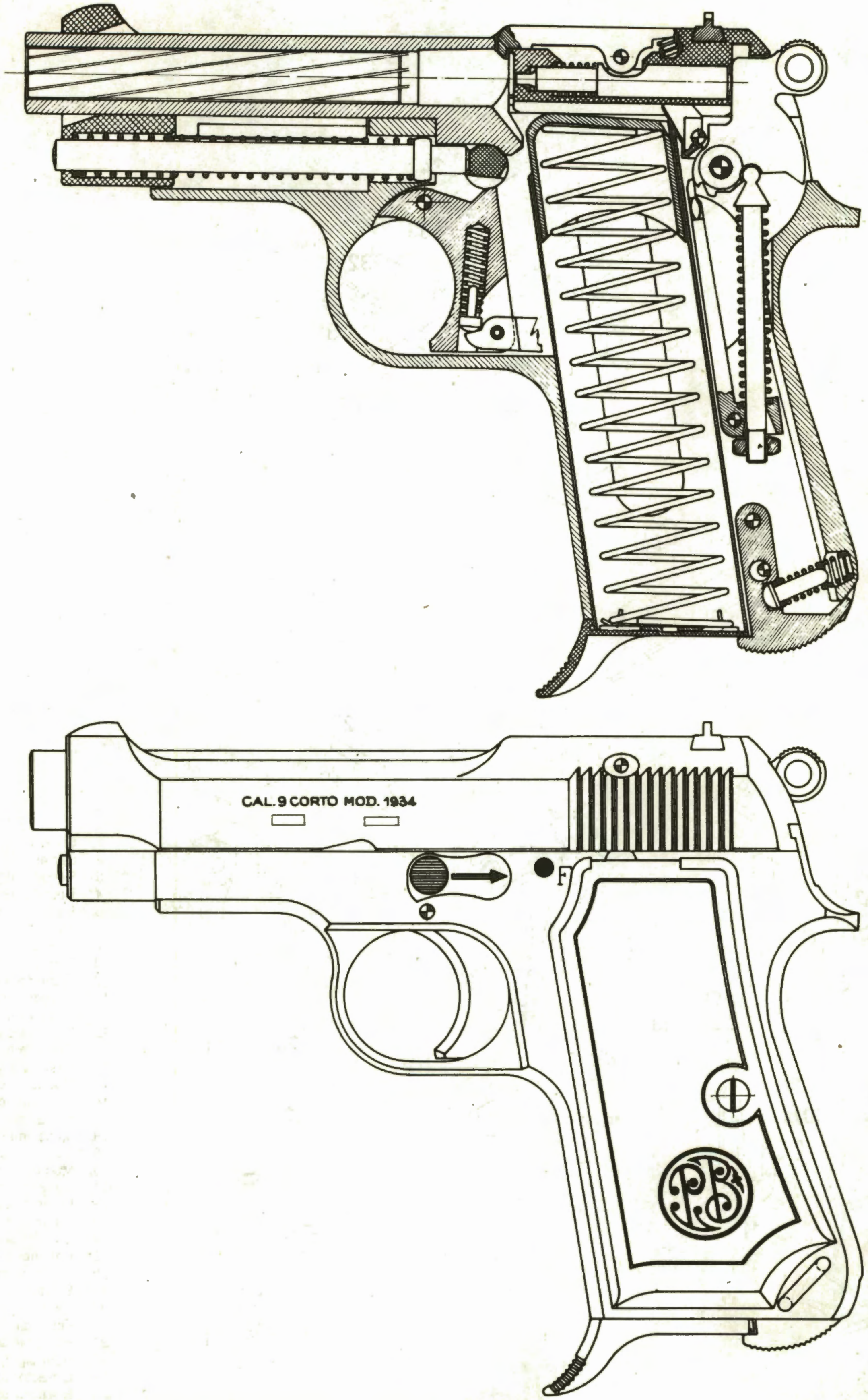
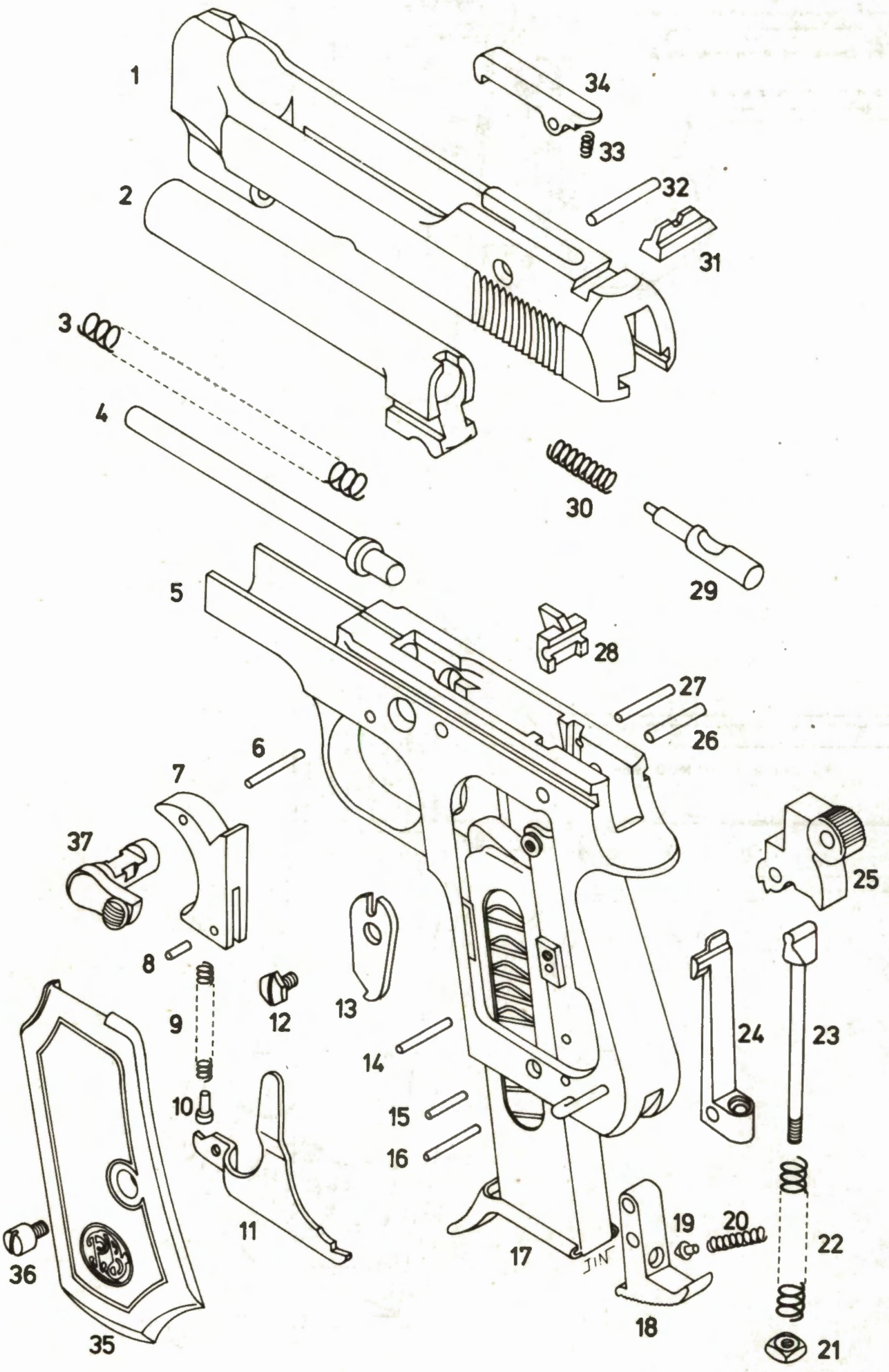


FIGURE 10–13. Sectional views of the Beretta Modello 1934. *(Menchini)*



1. Slide
2. Barrel
3. Recoil spring
4. Recoil spring guide
5. Frame (receiver)
6. Trigger pin
7. Trigger
8. Trigger bar pin
9. Trigger spring
10. Trigger spring plunger
11. Trigger bar
12. Sear plate screw
13. Sear plate
14. Sear lever pin
15. Magazine catch hinge pin
16. Magazine catch pin
17. Magazine
18. Magazine catch
19. Spring follower
20. Magazine catch spring
21. Hammer strut nut
22. Hammer strut spring
23. Hammer strut
24. Sear lever
25. Hammer
26. Hammer pin
27. Ejector pin
28. Ejector
29. Firing pin
30. Firing pin spring
31. Rear sight
32. Extractor pin
33. Extractor spring
34. Extractor
35. Grip plate
36. Grip plate screw

FIGURE 10–14. Disassembled view of the Beretta Modello 1934 pistol. ***(Jimbo)***

NOTES

1 Revelli also designed the 9mm Glisenti caliber Villar Perosa submachine gun/machine gun (1914), the Modello 1914 6.5mm Revelli (Fiat) machine gun, and the Modello 1917 25.4mm Revelli (Fiat) semiautomatic aircraft cannon.

2 R. K. Wilson and I. V. Hogg, *Textbook of Automatic Pistols* (London: Arms & Armour Press, 1975), p. 171; and John Walter, *Luger, An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present* (London: Arms & Armour Press, 1977), p. 22.

3 "Small Arms," chap. 3, in Military Information Div., Adjutant General's Off., War Dept., *Notes on Military Interest for 1902* (Washington: GPO, 1903), p. 109.

4 "Translation of contract between Messrs Greenwood & Batley, and Messrs Metallurgica Bresciana gia Tempini" [16 April 1907]; "Translation of letter dated 2/5/08 received by Alfred Herbert Ltd of Milan from Messrs Metallurgica Bresciana" [5 Feb. 1908]; letter, Luric Basso to Greenwood & Batley Ltd., 4 May 1908; and letter, Alfred Herbert, Ltd., to Greenwood & Batley, Ltd., 5 Aug. 1908 (all in file 11/2/56 of Greenwood & Batley Ltd. records in the Leeds Archives Dept., Leeds Public Library, Leeds, England).

5 Letter, Greenwood & Batley to Alfred Herbert, 27 Aug. 1908.

6 Letter, Alfred Herbert to Greenwood & Batley, 5 Aug. 1908.

7 Wilson and Hogg, *Textbook*, p. 171.

8 Ibid.

9 Letter, Frank A. Edwards to Chief Military Information Div., General Staff, War Dept., 14 July 1906, O.O. correspondence file 13,092/564, Record Group (RG) 156, National Archives.

10 Kenneth Morton et al., "Proceedings of a Board of Officers," 23 Jan. 1912, O.O. 13,092/2147, encl. 2, RG 156.

11 The Beretta section of this chapter is based upon Ugo Menchini, *Le Pistole Beretta, 1915–1974* (n.p.: Editoriale Olimpia, 1974); and J. B. Wood, "Beretta Automatic Pistols, 1915–1978," *Guns Illustrated, 1975* (Chicago: Follett Publishing Co., 1979), pp. 73–78.

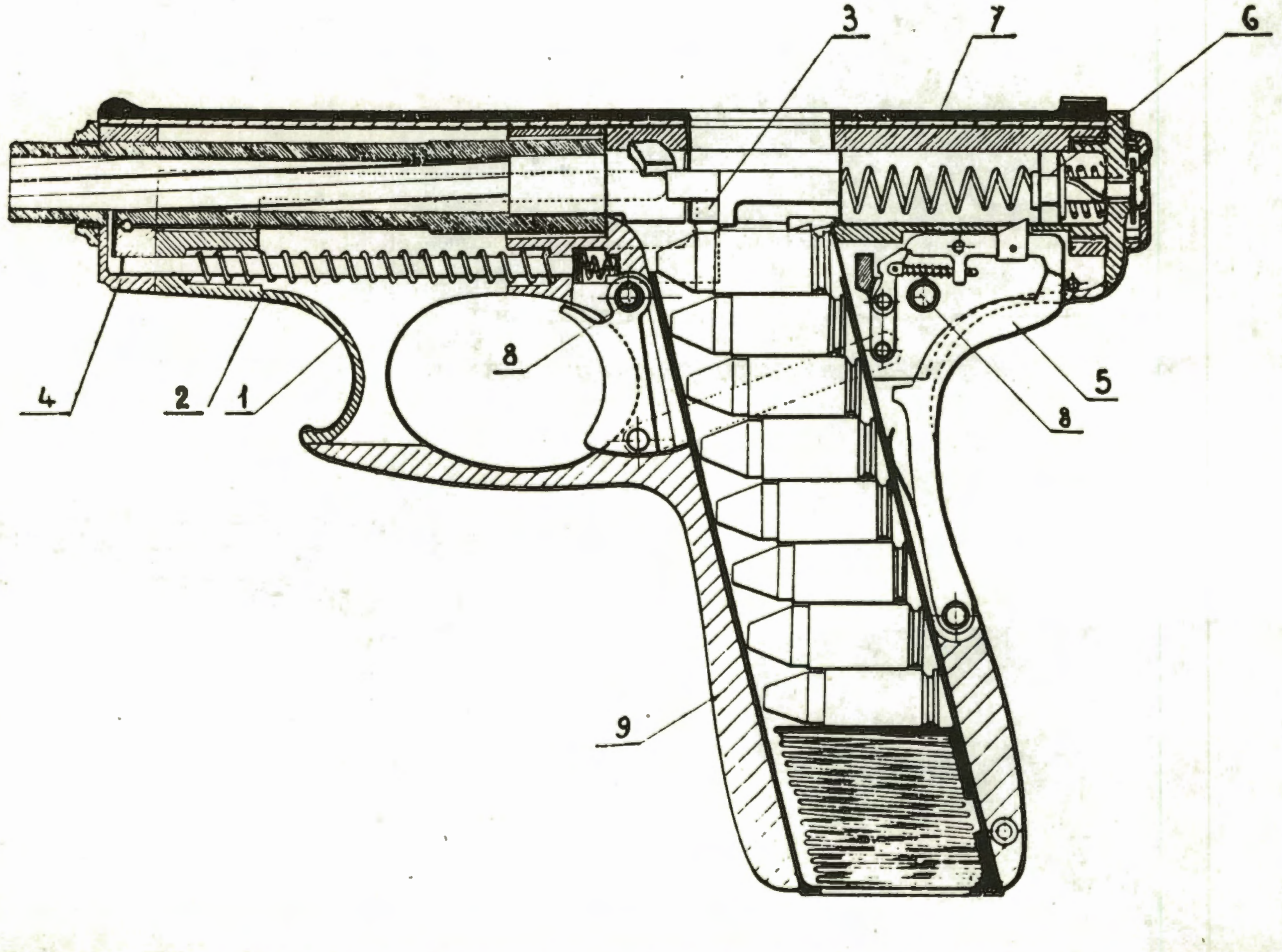


FIGURE 10–15. The proposed Scotti 9mm Parabellum gas-operated automatic pistol. With a 100-millimeter barrel, the handgun would have measured 183 millimeters overall and weighed 500 grams. It was designed to be locked by means of a rotating barrel and would have been issued with an 8-shot box magazine. *(Scotti-Forgette)*

FIGURE 10–16. Three views of Giulio Soss's 20-shot 9mm Parabellum pistol. *(Visser)*

11 BRITISH HANDGUNS 1900 TO 1945

Like the armed forces of other major powers, the British military entered the twentieth century using revolvers as side arms. Although British ordnance service personnel experimented with self-loading pistols in the early decades of the century, military leaders were not suitably impressed by this new class of handgun, especially in light of the fact that the army was often short of other more basic infantry weapons and equipment. This chapter explores the various British handgun trials of 1900–1938 in an effort to explain more fully why the British did not adopt a self-loading pistol.

SELF-LOADERS DURING THE BOER WAR

In 1899, the British army went to war against the two South African Boer republics, the Transvaal and the Oranje Vreie Staadt (Orange Free State). Far from being the quick "walk-over" anticipated by the British, this conflict became a three-year combination of set-piece combat and guerrilla warfare. As noted in chapter 2, standard-issue Webley revolvers were carried by the British throughout southern Africa, but the Boer War also provided a testing ground for new weapons, including self-loading handguns. Two self-loading, or self-actuating, pistols were used in the campaigns from 1899 to 1902—the C96 Mauser self-loading pistol and the Webley-Fosbery self-actuated revolver.

In 1899, the British government authorized the creation of volunteer military units made up of residents of the Cape Colony, located on the tip of South Africa. One of the most well known of these units, partly because of its ragtag makeup and dashing exploits and partly because Winston S. Churchill was both a member and a popular war correspondent for the London *Daily Mail,* was the Imperial Light Horse Regiment. Since this was not a regular regiment, the members could supplement their standard equipment with any items they wished using funds raised in England and South Africa as well as their own money. Several members of this elitist organization, including Lieutenant Churchill, purchased Mauser C96 pistols and then urged that the entire regiment be equipped with these shoulder-stocked pistol-carbines. Lieutenant Colonel A. H. Edwards, commanding officer, after considerable debate with his socially equal subordinates decided against procuring the C96 pistol. He thought it was too mechanically complicated and, therefore, potentially dangerous for issue to the rank and file, and since there was only limited time for arms instruction the rifle was the logical weapon with which to train new troopers. The extra weight represented by a pistol and its ammunition was also considered undesirable. As was so often the case at the turn of the century, many military men believed that the self-loader might be suitable for officers but it was surely too complex for the enlisted man to master.

The Webley-Fosbery revolver, a peculiar weapon, was also employed in limited numbers in the Boer War. Superficially it resembled other Webley revolvers of the period, but closer inspection revealed it to be considerably different. The two major clues that it was not just another revolver were the zigzag grooves cut into its cylinder and the horizontal recoil platform located just below the cylinder. The Webley-Fosbery design, invented by Colonel George Vincent Fosbery (c. 1854–1907) and developed by Webley & Scott, relied on the recoil forces of the pistol to rotate the cylinder after firing. A stud mounted on the nonrecoiling half of the revolver engaged the zigzag groove on the cylinder. Upon firing, the recoil caused the barrel, upper frame, and cylinder to move to the rear. As the parts moved rearward, the stationary stud sliding in the groove caused the cylinder to rotate halfway to the next chamber. On the return stroke of the upper assembly, the rotation continued until the next loaded chamber was aligned and ready to be fired. The inventor and manufacturer claimed that the Webley-Fosbery revolver was easier to shoot than the standard double-action revolver because part of the recoil was taken up operating the pistol and that it was quicker since the hammer was cocked after each shot. Tested by the U.S. Army in 1907, officers gave the following appraisal of the Webley-Fosbery:

> The introduction of an automatic feature in a revolver is, in the opinion of the Board, not desirable for the military service, the only gain of importance being the reduced "kick," due to the more gradual taking up of the recoil. The difficulty in reloading the arm on horseback, after 6 shots have been fired, is the same as in any other revolver; the introduction of the automatic feature adds to the complication and weight of the weapon, and double-action is not present. It is, therefore, necessary either to carry this arm with the hammer cocked and locked by the safety (which is not automatic), to cock by using the thumb on the hammer, or to cock by forcing the body and barrel to,the rear by pressure in the case of the first shot; or if the recoiling parts do not move fully to the rear in firing, or in case of misfire, the rotation of the cylinder and the cocking must be done by hand. The weight of the revolver without cartridges is 2 pounds and 10 ounces [1,190 grams]. In view of the above, the Board decided to discontinue the test of this arm.[1]

Developed just before the turn of the century, the first Webley-Fosbery automatic revolvers were manufactured in 1901 (patent 15,453 of 1895, 12,470 and 24,155 of 1896; U.S. patent 584, 631, 15 June 1897). A few of these .455 caliber (11.5mm) revolvers were used in South Africa and later during the First World War, but they were all privately

purchased arms, as the pistol was never officially adopted by the British armed forces. Although it was an interesting weapon from a design point of view, the Webley-Fosbery could never compete with other true self-loading pistols.

OFFICIAL TRIALS, 1900 TO 1914

Self-loading pistol developments in several countries at the turn of the century forced the British military to address the question of their suitability as replacements for the revolver. The major organization responsible for the early examinations of self-loaders was the Small Arms Committee, which worked in conjunction with the Chief Inspector of Small Arms (CISA) and the Chief Superintendent of Ordnance Factories (CSOF). Initially, trials were conducted at the Royal Small Arms Factory, Enfield, with more extensive testing taking place at the School of Musketry at Hythe or the Royal Navy's Gunnery Establishment, HMS *Excellent,* on Whale Island. Requirements established for an acceptable self-loader included a projectile weighing 13 grams with a diameter of at least 10 millimeters and a maximum projectile velocity of 365 meters per second at the muzzle. These specifications were unofficial guidelines since there was no official requirement for the development of a self-loader. As events were to prove, these specifications would eliminate most self-loading handguns available from 1900 to 1910.

Borchardt-Luger

In April 1900, the British Small Arms Committee was shown the Borchardt-Luger Parabellum pistol by a Mr. Dawson of Vickers & Son and Alexis Riese of the Deutsche Waffen- und Munitionsfabriken. This pistol was still in the prototype stage, and Herr Riese told the committee that it would be a few months yet before DWM would be ready to manufacture it in large quantities. The British ordered 6 pistols and 3,000 rounds of ammunition to be delivered as soon as possible for testing. The Small Arms Committee also inquired about the possibility of making a .45 caliber (11.43mm) version of this pistol.

On 13 October 1900, Vickers' Sons & Maxim Company informed the authorities that their pistols and ammunition were ready for delivery and made an appointment for the 22nd to demonstrate the operation and effectiveness of the pre-mass-production 1900 pattern Borchardt-Luger Parabellum. During the next two weeks, these pistols were tested by the Chief Inspector of Small Arms staff, who forwarded their report to the Small Arms Committee through the director general of ordnance on about 9 November.

> The pistol is well made, is of good design, and handles comfortably. The breech bolt is strongly secured to the sideplates by means of the toggle joint and a stout axis pin; there is no liability of its being blown out into the firer's face. I do not think this pistol, or the Roth or Steyr automatic pistols, could be adapted to take the Webley cartridge, for, the magazine being in the handle, this large cartridge would make the handle un-

FIGURE 11–1. The 1902 model .455 caliber (11.5mm) Webley-Fosbery automatic revolver recoiled to the farthest extent. This particular example carries the inscription "Presented to Major C. Playfair, 14th R. War: Regt. by the Directors of Webley & Scott Ltd., October 1914." *(Webley & Scott)*

FIGURE 11–2. The 1902 Webley-Fosbery pistol opened for reloading. ***(Krcma)***

wieldy. An important advantage that this pistol possesses over the others mentioned above is the fact, when the eight rounds contained in the magazine have been fired, the magazine can be replaced by a full one and fire resumed in four or five seconds. In the other pistols the magazine has to be reloaded from a clip [charger] which, even on a range, often does not work smoothly. The pistol may safely be carried ready loaded as there are two safety arrangements both of which act properly. One is automatic and is disconnected by gripping the stock, the other is operated as required by the thumb of the right hand. The pistol is easily stripped for cleaning or inspection without the aid of tools, it may be entirely dismantled with the aid of the small drift and screwdriver supplied. The latter is only required for the screws fastening the wooden grips. There is no danger of a bullet remaining in the barrel on account of a light charge, and another cartridge being automatically loaded up and fired. Cartridges loaded with 1½, 2 and 2½ grains [.097, .13, and .16 gram] of powder used, fired the bullets out of the barrel but did not load up the next cartridge.

The pistols have fired about 120 rounds, without a missfire or any failure. On one occasion the pistol was heavily dusted with sand before firing without interfering with the automatic action. The accuracy of the pistol was quite satisfactory, and the penetration very good, as shown below:

Gun: penetration
Webley Mark 4 revolver: 9 boards
Russian revolver [Nagant obr. 1895g]: 11–12 boards
Roth automatic pistol: 5–7 boards
Steyr automatic pistol: 7 boards
Borchardt Luger automatic pistol: 14–15 boards
Each board was a ½-inch [13-millimeter]-thick piece of deal [fir or pine],
spaced at I in [25-millimeter] intervals.

The bullet might be improved, for after passing through 15½-inch [12.7-millimeter] planks it was not set up. The steel envelope in which the lead core is contained would probably wear the rifling unnecessarily much. The recoil in this pistol as in the other automatic pistols is but little felt.

The pistol, on account of its having no cylinder, packs flatter in the holster than a revolver.

In conclusion, this is a good serviceable weapon, and is much to be preferred to any of the other revolvers or automatic pistols we have had for trial. The only point I have not been able to ascertain is the wounding power of the bullet.

Penetration tests into boards or clay blocks do not give a fair idea of this. I consider that this pistol is worthy of extended trial.[2]

The Small Arms Committee recommended that comparative lethality tests of the 7.65mm Parabellum and the .455 Webley (11.5mm) cartridges be undertaken by the School of Musketry and the Royal Laboratory at Woolwich. Two Borchardt-Luger Parabellums were sent to each of those facilities: one was kept at the Royal Small Arms Factory, and one was sent to the director general of ordnance. Since there were no standardized tests for lethality and wounding power, the specialists set about devising suitable procedures and chose to test the projectiles against living targets—two sheep and a bullock. (As a humanitarian gesture and perhaps to make the animals easier to hit, they were stunned with the blow from a poleax before the shooting started.) Reporting on shooting at the sheeps' skulls from a distance of 61 centimeters, Lieutenant Colonel James of the Royal Army Medical Corps noted:

1. Borchardt-Luger bullet

The wound of entrance was through the centre of the frontal bone, was small in size (about the circumference of the bullet), circular and cleanly cut through. The passage made by the bullets through the soft parts was equally small, and not more than the circumference of the missile itself. The wound of exit through the middle part of the neck, was cleanly cut, and no more than

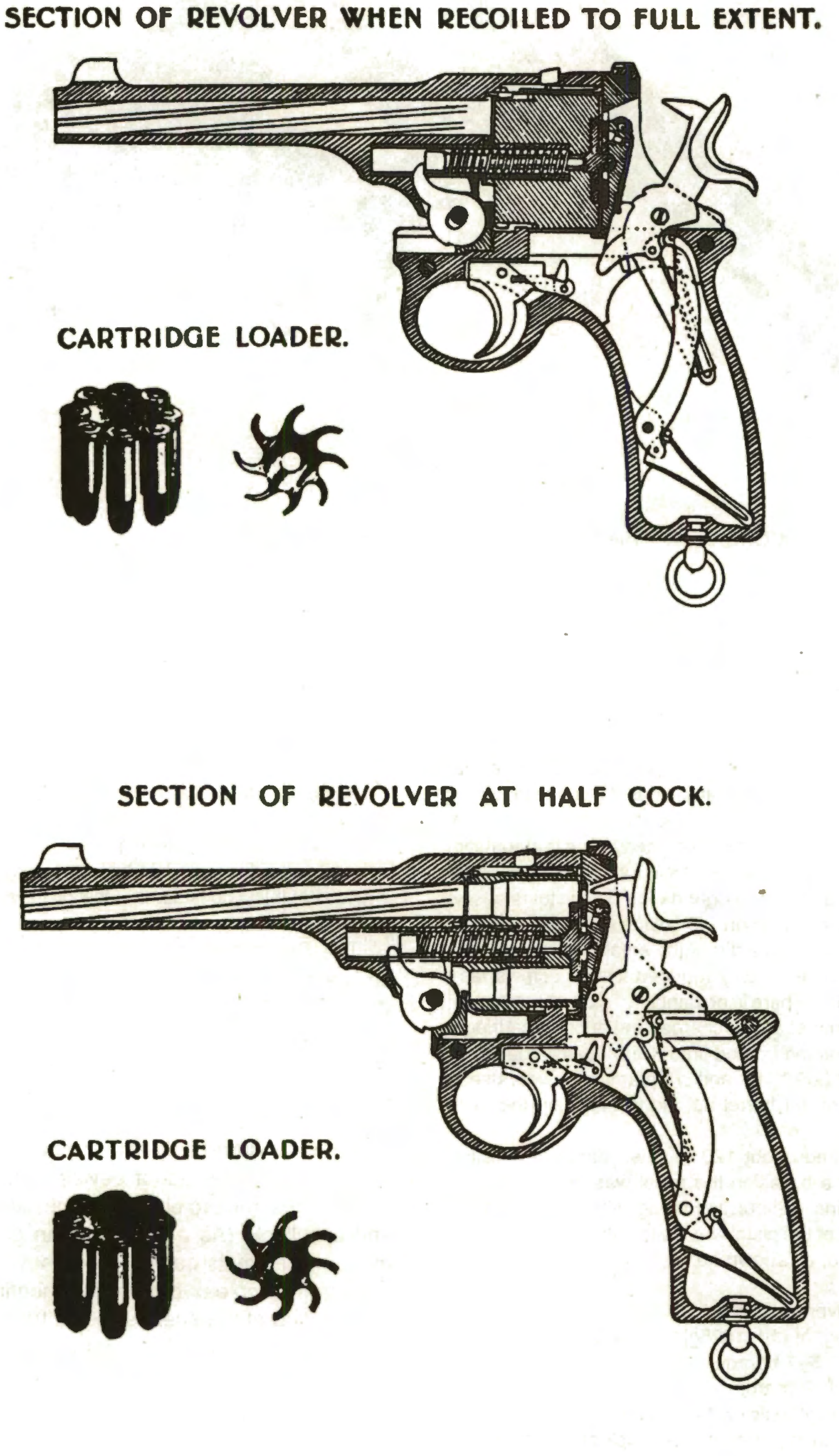


FIGURE 11–3. Sectional views of the Webley-Fosbery automatic revolver. *(Webley & Scott)*

the wound of entrance.
2. Webley revolver bullet
The wound of entrance was not so cleanly cut, was much rougher to the touch, and was fully half as large again as the wound caused by the Borchardt bullet. There was also a good deal of vertical splintering of bone. The passage left by the bullet through soft parts was also much larger and there was a greater destruction of surrounding tissues than seen in the case of the Borchardt bullet. The wound of exit was considerably larger than that of entrance.

Colonel James went on to point out other factors.

> None of the Borchardt bullets were distorted, even after passing through thick bones; the Webley bullets were uninjured when passing through meat only, but were deformed slightly on striking bone.
>
> It is absurd to suppose that the two bullets could have comparable stopping powers considering that both can penetrate a man. The vital question is whether the Borchardt bullet would have sufficient shock. It is doubtless capable of breaking a bone, causing death, or penetrating the body, but whether its entry into the less vulnerable parts of the body would inflict sufficient shock can only be ascertained by actual knowledge.[3]

After reviewing the results of the shooting trials, the Small Arms Committee concluded that a "high velocity bullet of small calibre, expended less of its energy on the object struck than did the large Webley bullet." It was the opinion of one medical expert that "unless a bullet from the Borchardt traversed a vital part, or fractured one of the bones of the leg or thigh, it would have little effect in stopping a man determined to come on so long as he had power to do so." The Committee concluded that two or more shots would have to be fired "to secure the same man-stopping effect as one Webley bullet," which meant that the automatic pistol's "effective rate of fire is no greater than" the Webley revolver. What the British wanted was a handgun that had the Borchardt-Luger's rapidity of fire and the man-stopping character of the Webley revolver. One of the acknowledged problems was the need for jacketed bullets in self-loaders. If soft-lead projectiles could have been used, the wounding effect of the Borchardt-Luger would have been greater. Jacketed bullets were a necessity.[4]

In October 1901, the Naval Gunnery Establishment HMS *Excellent* submitted a report on the comparative trials of the Borchardt-Luger, the Mauser C96, and the Modèle 1900 FN Browning pistols. The naval experts ranked the Borchardt-Luger first, the Browning second, and the Mauser a poor third. The major complaints against the Mauser were excessive jams, an awkward reloading process, and an inadequate safety mechanism that allowed the pistol to be fired when the safety was released on a cocked weapon. Although the Browning was light, compact, and relatively simple in construction, it had an unnecessarily heavy trigger pull, and the cartridge was woefully inadequate by British standards. The Small Arms Committee used these test results to eliminate the Mauser and Browning designs from further consideration.

On 7 March 1902 Vickers' Sons & Maxim Ltd. informed the Small Arms Committee that the Borchardt-Luger Parabellum was being modified to fire a 7.97-gram 9mm projectile at velocities ranging from 315 to 330 meters per second. The officials' response was to ask why a .40 caliber (10.16mm) version could not be developed. In December, the Vickers' representative replied that such a caliber was not practical, since it was the manufacturer's opinion that 9mm was the limit for this particular design.* In part, the Vickers' Sons & Maxim letter of 18 December read as follows:

> We find it practically impossible to submit a Borchardt pistol fulfilling the requirements specified, viz.:—Having a calibre of not less than .4-inch, and firing a bullet of 200 grains in weight. By actual experiment it is found that the maximum calibre which could be given to the Borchardt pistol is 9mm (i.e., .354-inch), firing a bullet weighing 8 grammes (123 grains). Such a pistol with its ammunition could be submitted for trials in the third week in January next, and we would respectfully ask you to agree to try this pistol, as, in many respects, we feel confident that it would be found satisfactory, both as regards accuracy of fire, rapidity of fire, and stopping power. Although the bullet is somewhat smaller than what you have specified, we beg to state that the muzzle velocity is higher, and consequently the muzzle energy of the bullet will be as great as in the case of a weapon firing a heavier bullet with a larger calibre, and, on that account, possessing only a lower muzzle velocity. Moreover, in the case of an automatic pistol of great accuracy, it would be found that the possibility of firing two or even three shots in most rapid succession would, in many cases, not only compensate for the lack of weight of the bullet, but also would give a better chance of disabling an enemy by the infliction of several wounds although of a less-serious nature.[5]

Nine years later in September 1911, the Vickers company submitted a Pistole 08 to the Chief Inspector of Small Arms for tests, and although the Chief Inspector gave it high marks, the Small Arms Committee merely noted his report that the caliber was still too small.

In addition to the Parabellum pistols, several other self-loaders were tested by the British during the first three years of the new century. These included the Bergmann, the Roth-Steyr, the Roth, the Mars, and a few lesser-known types of automatic pistols.

Bergmann

In July 1900, a Colonel Roberts, late of the Royal Artillery, introduced Theodor Bergmann and his pistols to the British Small Arms Committee. After two years of inaction, the Wilkinson Sword Company had introduced two new models (9mm and 10mm) of the Bergmann self-loader, one of which was essentially the same pistol as one tested in Spain that was adopted as the *Pistola Bergmann de 9m/m Modelo 1903*. On 23 June 1902, the chief inspector of small arms presented his report on two different 10mm Bergmanns. Pistol number 738 (serial number) was the locked-breech type, which used a higher velocity cartridge (the model later adopted by Spain). At 14 meters, its 6.87-gram projectile developed a velocity of 256 meters per second. Pistol number 3, a blowback design, fired a 6.87-gram bullet and had a

*See chapter 6 for a discussion of the .45 caliber (11.43mm) version of the Parabellum developed in 1906 for the handgun trials in the United States. Though feasible this larger caliber variant was not practical.

velocity at 14 meters of 233 meters per second. At 22.9 meters, both projectiles penetrated seven 12.7-millimeter boards (88.9 millimeters). The British ordnance staff reported that both of the Bergmann pistols were well made and accurate, but neither would reload when fired. This was due, said the Wilkinson Sword Company representative, to hurriedly prepared ammunition of insufficient power. The bullets were merely a shell and did not expand well on impact. The locked-breech pistol failed to extract four times. The chief inspector considered the pistols worthy of further trials if suitable ammunition were available, and Bergmann agreed to produce an 11mm version of his pistol. If the bullet weight and velocity conformed to their requirements, the committee would consider it. (Bergmann also demonstrated his 6.5mm automatic pistol during these trials, firing 48 rounds without any failures.)

In January 1903, Wilkinson Sword submitted an 11mm Bergmann pistol with suitable muzzle velocity, but with a bullet weight of only 9.6 grams. The manufacturer wanted this weapon to be accepted for trial to demonstrate the acceptability of the design. If a production contract seemed likely they would develop a 13-gram bullet, although they would prefer to limit it to 11.3 grams. The committee, however, would not recommend further trials, as the basic pistol did not appeal to the members.

Roth-Steyr

Arrangements were made in October 1900 by the Small Arms Committee for a Roth-Steyr automatic pistol to be sent to Enfield for trial. The chief inspector of small arms reported that same month that the caliber of this handgun was about 7.65mm, that the handgun consisted of 33 parts, and that it had an 8-round magazine. This rather incomplete report also stated that accuracy was fair at 22.9 meters, that penetration was 7 boards (91 millimeters plus airspaces) at 22.9 meters, and that in 50 rounds there was one misfire and three failures to extract. The pistol was not recommended for service.

Roth

In October 1900, the chief inspector of small arms reported on a Roth automatic pistol. This was a double-action handgun in 7.65mm with a 10-round magazine (clip-fed) housed in the grip. The bullet weighed 5.5 grams with a .32-gram charge. The penetration of the projectile was measured at 7 boards (91 millimeters plus airspaces) at 22.9 meters. Though well made, the pistol was not recommended for further trial.

In May 1902, Georg Roth submitted an 11.5mm pistol, similar in design to the one tested in 1900, and 11.5mm and 8mm models of an improved design. Pistol number 119 (serial number) in 11.5mm had a rotating bolt, weighed 1,134 grams, and had a muzzle velocity of 200 meters per second. Pistol number 120, also 11.5mm, with a straight bolt weighed 1,134 grams and had a muzzle velocity of 204 meters per second. Pistol number 121 in 8mm had a rotating bolt, weighed 1,000 grams, and had a muzzle velocity of 270 meters per second.

Both 11.5mm pistols were loaded by chargers with sliding thumb pieces holding 7 rounds, while the 8mm model used a charger that held 10 rounds. Pistol 119 fired 53 rounds with one hangfire and three jams. Its accuracy was good, and the projectile went through 7 boards (91 millimeters plus airspaces) at 22.9 meters. Pistol 120 failed after 6 rounds, and no evaluation was possible. The 8mm pistol fired 66 rounds with good accuracy; but jammed three times, misfired once, and fired two rounds for one trigger pull once. Details of the Roth ammunition were as follows: for the 11.5mm 13-gram bullet—.32 gram of smokeless powder, complete cartridge weight 19 grams; for the 8mm 7.5-gram bullet—.24 gram of smokeless powder, complete cartridge weight 10.6 grams.

The Small Arms Committee recommended that Roth be informed of the failures. Further trials would take place only if he produced a satisfactory pistol conforming to their requirements. In January 1903, Roth reported that he could supply a pistol that met the committee's standards, and two months later the small arms experts examined it. The test report gave the new pistol's weight as 1,700 grams, although Roth had referred to it as weighing 1,220 grams. The caliber was 11mm, with a 140-millimeter barrel. The bullet weighed 16 grams, and it penetrated 13 boards (169 millimeters plus airspaces). Roth stated the muzzle velocity to be 297 meters per second, but the British test group recorded it at 252 meters per second at 27.4 meters.

The magazine of Roth's 11mm pistol was loaded by a 7-round thumb-piece charger. In all, 100 rounds were fired in the trials, including a sand test, in which only one round fired satisfactorily. The pistol was quite accurate, however. The chief inspector concluded that the pistol was too heavy and too likely to jam in sandy conditions. The charger was also a source of concern because it would be hard to load under combat conditions. Roth's 11mm pistol was then sent to Hythe to be tested against a Mark IV Webley revolver. A total of 92 rounds were fired from the Roth in this test. While the Webley was found to be more accurate at 22.9 meters, the reverse was true at 46 meters. There were 10 jams and 29 misfires with the Roth, which were not attributed to faulty ammunition. At Hythe, it was observed that the magazine platform was at the wrong angle and caused the jams. The pistol also had too many openings that would admit dust, according to the evaluators.

Six years later in June 1909, the British tested and reported on a pistol referred to as the Roth Mark II automatic pistol, which had been introduced by a Mr. Andresa and a Mr. Spiro. The 11mm handgun weighed 1,134 grams and had a charger-loaded 8-round magazine. With a 13-gram bullet (.3 gram of powder), the muzzle velocity was 250 meters per second; penetration was 10 boards (130 millimeters plus airspaces). This pistol had no safety catch, but it was described as being handy and well-balanced. It stripped easily and was light on recoil. Certainty of action was rated as good, and the pistol performed well in the sand test; but the Committee took no action on this favorable report.

Browning

The British Small Arms Committee received a letter from the British Military Attache in Brussels in October 1900 drawing their attention to the Belgians' decision to replace their revolvers with the 7.65mm Browning Modèle 1900 made by Fabrique Nationale. In reply, the committee reported that they

FIGURE 11–4. The .360 caliber (ca. 9.1 × 27mm) Mars pistol designed by Hugh W. Gabbett-Fairfax. These pistols were among the strongest self-loaders ever designed, but they were also known for their peculiar loading process. In most self-loaders, the breech block or bolt pushed the loaded cartridge out of the magazine and into the chamber on the closing stroke. In the Mars pistol, two fingers of the cartridge lifter withdrew the new cartridge from the magazine during the recoil stroke, and as the bolt closed the cartridge was pushed out of the cartridge lifter by the bolt head. *(Visser)*

had no intention of following up this information unless the FN Browning were also available in .45 caliber (11.43mm). In November, the attache wrote again to report that FN believed 11mm to be impractical; the limit for this design had been assessed at 9mm. The letter pointed out that the Belgians, like the British, had originally objected to the small caliber but had overcome their objections. The Belgians sent one standard Modèle 1900, a long-barrel version, and 500 rounds of a new pattern ammunition to the committee for their evaluation.

By December, the British specialists had reported on trials with the Browining. Some 80 rounds had been fired without any malfunction, and accuracy was deemed reasonable. However, the pistol was difficult to fieldstrip and penetration was poor because the bullet weighed only 4.8 grams. The pistol weighed 765 grams and was blow-back operated. Believing the chances of increasing the caliber to be small, the Committee deferred judgment until a later date. In October 1901, the Browning Modèle 1900 was tested at the HMS *Excellent* along with the Borchardt-Luger and the Mauser C96. Surprisingly the Browning was judged a close second to the Borchardt-Luger. Generally, the naval report tallied in detail with the chief inspector's view of the Browning, and the committee decided against further testing of the design. Another letter from the Belgian Military Attache in June 1902 enclosed a photograph and details of a new model 9mm Browning, the FN Browning Modèle 1903. It fired a 7-gram bullet at 335 meters per second. The committee, however, refused to resume trials of a Browning unless the caliber were increased. FN, of course, declined to make such a caliber change.

Mars

Hugh W. Gabbett-Fairfax's Mars self-loader was the first domestic automatic pistol tested by the British Small Arms Committee. Gabbett-Fairfax apparently began his self-loading handgun design work in 1895; and although none of his early prototypes survived, it is known that they differed from the four-lug, rotating-bolt designs produced in the 1898 model and in the Mars pistols. The 1898 design (British patent 9067 of 1898) was chambered for a bottleneck .360 caliber (about 9mm) cartridge. The magazine was located in the grip; but instead of the cartridges being fed directly into the chamber, they were shoved onto a lifter located forward of the magazine and above the trigger guard. This lifter was then forced upward by spring action and the cartridges fed into the chamber. In 1898 and 1899, Thomas William Webley (1839–1904) negotiated a contract with Gabbett-Fairfax on behalf of the Webley & Scott Revolver & Arms Company that gave the company exclusive license for the manufacture of the Mars pistol once it was perfected.

The first known model of the Mars manufactured by Webley appeared in late 1899. It used the 1898 design's locking and feeding mechanisms and was made in .360 caliber (about 9mm). The only major change was an outside hammer to facilitate cocking. Under the direction of Gabbett-Fairfax and William John Whiting, the Webley company produced about 12 specimen pistols in calibers 8.5mm, 9mm, .360 (about 9mm), 10mm, and .45 Long (11.43mm).* These prototype models were supposedly marked with Roman numerals, I to XII. A few of these experimental handguns were modified at a later date, with the marking *F* followed by the appropriate Roman numeral affixed to them.

By 1900, the Mars pistol was beginning to have a standardized form. British patent 14,777 of 17 August 1900 described a pistol that used "the same method of locking as the previous models, but with a much shorter breech-bolt and an entirely different method of feeding. Instead of the cartridges being fed forward out of the magazine, they were now pulled backward out of the magazine, tilted upward, and then fed into the chamber." In 1901, the Mars Automatic Pistol Syndicate, Ltd., of Birmingham was formed to promote the sale of these handguns, and Webley & Scott terminated their participation in the further development of the Mars. The new company had intended to establish a factory for the manufacture of their pistol but never did. Instead, the Mars pistols were made on a contract basis by several gunmakers in Birmingham and London, with the design and improvement work being performed by Lieutenant Colonel Johnstone and a Mr. Brown, associates of Gabbett-Fairfax. Beginning with serial number 1, Syndicate specimens went to at least number 56. The calibers available were 8.5mm, 9mm, .360 (about 9mm), .45 Long (11.43mm), and .45 Short (11.43mm). The 10mm cartridge was discontinued, as was a .472 caliber (12mm), on which the inventor had begun working in March 1901, when even the .450 Long proved too powerful for the design. Mars pistols were produced with barrels as long as 305 millimeters, and some had a provision for a shoulder stock. On 11 March 1901, Gabbett-Fairfax and Johnstone met with the Small Arms Committee and gave a full description of the standard models available: Number XI in 10mm (weight 1,304 grams, 11.34-gram bullet, .77-gram flake cordite charge); Number X in 9mm (weight 1,275 grams, 10.37-gram bullet, .77-gram flake cordite charge); Number IIIf in 8.5mm (weight 1,162 grams, 9.72-gram bullet, .65-gram flake cordite charge); Number VI in .360 (weight 1,205 grams, 10-gram bullet, .77-gram flake cordite charge); and Number VII in .360 (weight 1,332 grams, 10-gram bullet, 12-gram flake cordite charge). The barrel lengths in these models were 234 millimeters, except Number VI, which had a 305-millimeter barrel. Magazine capacity was 10 rounds.[6]

The director general of ordnance was apparently impressed by the Mars pistol. His favorable and somewhat optimistic report of 11 March 1901 noted:

> The "Mars" pistol is loaded, cocked, and the fired cartridge ejected automatically. The cartridge is inserted into the barrel of the pistol, whereby the entire force of the powder gas is utilized, and large charges of slow-burning smokeless powder can be used.
>
> The revolver, on the contrary, must be cocked after each discharge, and the powder is not consumed in the barrel, but in a separate detachable chamber at the rear of the barrel, a large proportion of the propelling power of the gas being thereby wasted. Smokeless powder can be used in the revolver in very limited charges only.
>
> It will be possible, when the plant necessary for production

*Whiting translated Gabbett-Fairfax's ideas into steel. He was the creator of the Webley self-loading pistols.

FIGURE 11–5. A .450 (ca. 11.43mm) Mars self-loading pistol (serial no. 195). (Visser)

> in quantities has been laid down, to place upon the market a thoroughly reliable automatic pistol at a cost no greater than that of a first-class self-extracting revolver; its weight and length do not exceed that of the latter; the working parts are not so numerous, and the "Mars" automatic pistol is not more complicated than any self-extracting revolver.[7]

Trials had proven the Mars pistol to be accurate at 274.3 meters without the stock and accurate at 548.6 meters with the stock and a 305-millimeter barrel. With its very high velocity and great power, the director general likened it to a "small and very compact rifle."

On 13 March 1901, Gabbett-Fairfax, building on the momentum established by the favorable test reports, wrote to the director general of ordnance: "I shall be prepared with an automatic magazine pistol to fulfill the following conditions, viz.: Magazine to contain eight cartridges. Projectile, 250 to 260 grains [16.2 to 16.8 grams, 12-millimeter diameter]. Muzzle velocity not less than 1,000 f.s. [305 meters per second] ." Three days later the superintendent of the Royal Small Arms Factory reported on trials with the 9mm Model X Mars pistol:

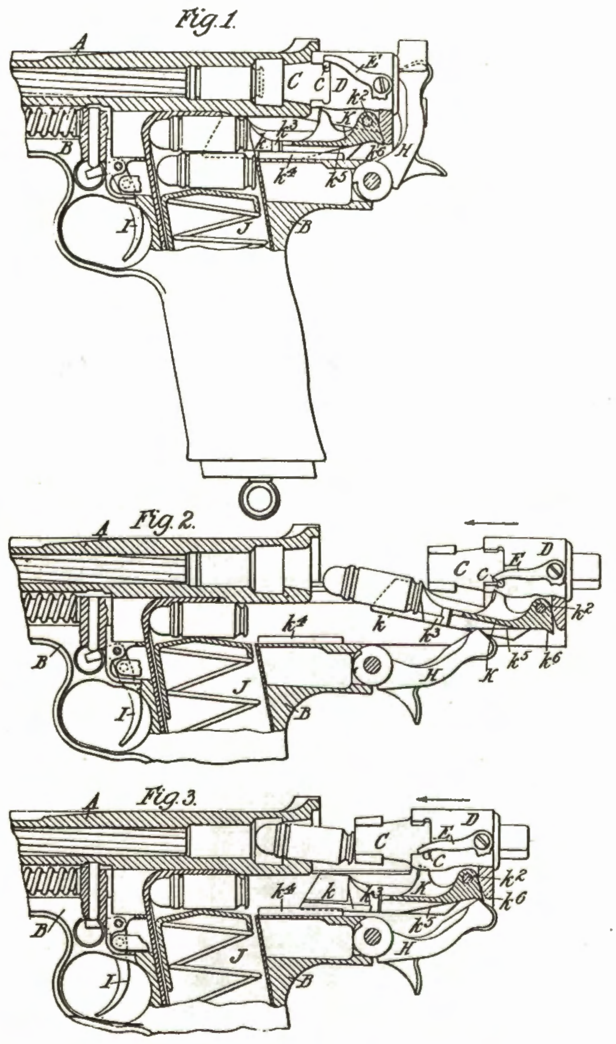


FIGURE 11–6. British patent 25,656, awarded in 1905 to the Mars Automatic Pistol Syndicate, illustrated the operating mechanism of the Mars self-loading pistol. *(British Patent Office)*

> a) It penetrated 18 ½-inch [12.7-millimeter] deal boards 1-inch [25 millimeters] apart, as against the Service Webley of 10 boards. Range, 12½ yards [11.43 meters].
> b) The enclosed shows the diagram obtained by Mr. Fairfax at 15 yards [13.7 meters].
> c) Captain Wallace and myself fired the pistol, which worked well, and without excessive jar on the wrist.
> d) Owing to the charge not being sufficient, there were one or two failures, but fire was immediately resumed by pulling back the breech mechanism.
> e) As with all automatic pistols, the mechanism is rather complicated, but still it seems to work well, and appears worthy of a further trial.[8]

After reviewing the reports from the director general of ordnance and from Enfield, the Small Arms Committee decided to obtain two of Gabbett-Fairfax's .450 caliber (11.43mm) pistols for further examination. In April 1901, Gabbett-Fairfax indicated a readiness to supply these handguns, but asked that they be returned after the test procedures since they cost £100 ($488.66) each to build. The Small Arms Committee agreed, and it met on 11 November to consider the chief inspector of small arms' report on the tests of these newest Mars pistols. At 27.4 meters, the .450 caliber (11.43mm) projectile had a velocity of 347 meters per second, and at 23 meters the 14-gram bullet penetrated 16 to 18 12.7-millimeter pine boards. Accuracy at ranges from 23 to 91 meters was good. While the heavy (1,390-gram) pistol "handled comfortably," the report mentioned that its recoil was "heavy." The chief inspector noted several other points:

> The pistol was stripped, and required the use of tools to do so. The parts were numerous and complicated, and the pistol would require a good deal of training on the part of the armourers to strip and reassemble.
>
> Next day I fired 31 rounds. At first round an empty case caught in the mechanism, and at the last round the connecting piece broke, preventing the pistol from firing. The ejection is straight to the rear, and sometimes the empty cartridges strike one in the face.
>
> The magazines, which are inserted and withdrawn through the bottom of the stock, hold eight rimless cartridges, firing 11.57 grains [.75 gram] of finely cut cordite and a 216-grain [14-gram] bullet covered with a stout nickel envelope.[9]

The .450 (11.43mm) Mars pistols were returned to Gabbett-Fairfax for the correction of two defects—the ejection of the cartridge case into the shooter's face and the heavy trigger pull.

In February 1902, the School of Musketry at Hythe reported on tests of the Mars pistol. To evaluate its accuracy, the Mars and the Webley Mark IV were fired at 23, 46, and 92 meters from a table rest (using Mark III ammunition in the Webley). At all three ranges, the Mars pistol was more accurate than the Webley. A further test was held to determine accuracy combined with rapidity, and in 30 seconds at 23 meters, the Webley fired 11 shots against the Mars' 16. The Mars pistol was again significantly more accurate.

As far as the mechanism test was concerned, once the recoil spring was correctly adjusted the experts at Hythe found the operation satisfactory; although the trigger pull (4.5 kilograms) was still too heavy and the ejection angle still required alteration. In addition, the pistol was thought to be too heavy, and the recoil excessive. There was a discrepancy

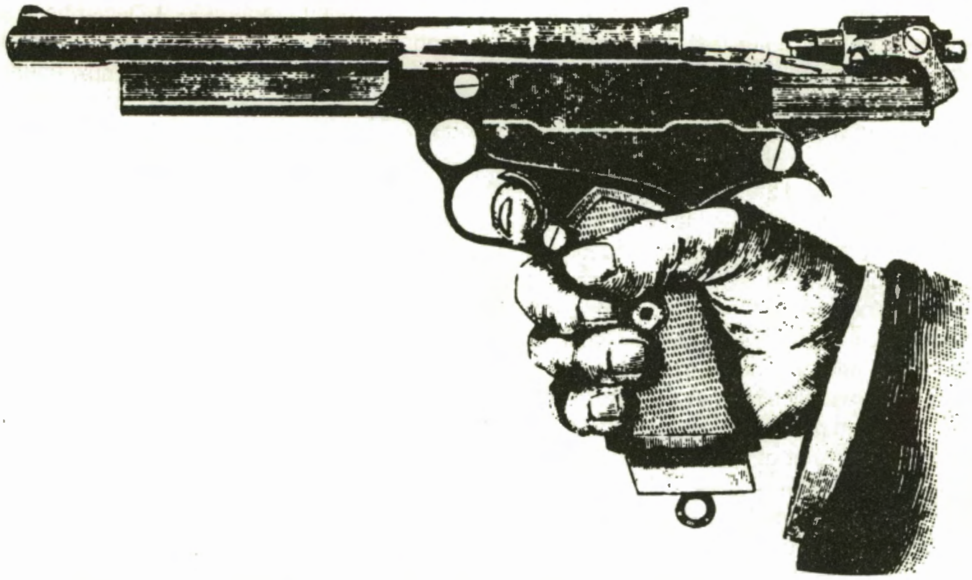


FIGURE 11–7. This drawing illustrates the massive size of the .450 Mars pistol. When static, the pistol was well balanced, but this changed when it was fired and all the parts of the pistol's operating mechanism started to move. *(Mars)*

in reporting the .45 caliber (11.43mm) pistol's weight: staff at HMS *Excellent* reported it to be 1,850 grams; whereas Hythe showed it as 1,417, which was closer to the weight reported by the chief inspector of small arms. The navy report noted five misfires due to faulty ammunition, some failures to extract and reload, and empty cases hitting the user's face; but no mention was made of the recoil. Naval experts found the pistol accurate, but in their conclusion the Borchardt-Luger was a better automatic pistol. Having reviewed the two reports, the Small Arms Committee found the .45 caliber (11.43mm) Mars unsuitable and recommended no further trials. The remarks concerning trigger pull and extraction were to be passed on to Gabbett-Fairfax for his comment. In the meantime, the committee asked to have the .35 caliber (9mm) model back for further trials. Gabbett-Fairfax wrote to the committee in March 1902, promising to remedy the defects noted and arranging to send a 9mm model pistol to them.

Further tests of the 9mm and .455 (11.43mm) Mars pistols in April 1902 revealed the pistol mechanism's sensitivity to sand and dirt and reinforced the evaluation team's concern about the weapon's recoil. The chief inspector told the director general of ordnance: "The recoil of these pistols is very severe. Mr. Fairfax should be asked whether he could alter the .45-inch [11.43mm] pistol so as to give a velocity not greater than 1,000 f.s. [305 meters per second], and as much less down to 800 [243 meters per second] as he could arrange for. Also whether an uncoated hard lead bullet, similar to the Webley Mark II bullet; or a bullet of a softer character than those recently tried, could be supplied for use in this pistol."[10] Gabbett-Fairfax had been too successful, it seems, in developing a powerful self-loader.

In June 1902, the chief inspector of small arms reported on a .45 caliber (11.43mm) Mars pistol tested for reduced velocity with three types of ammunition: Type A (.58 gram cordite, bullet weight 14.3 grams, velocity at 13.7 meters 292 meters per second, penetration 12 boards); Type B (.51 gram cordite, bullet weight 14.3 grams, velocity at 13.7 meters 254 meters per second, penetration 9 to 12 boards); and Type C (.45 gram cordite, bullet weight 14.3 grams, velocity at 13.7 meters 230 meters per second, penetration 8 boards). All of the bullets were nickel-coated with two cannelures. Accuracy for all three types was good, and types B and C gave no more recoil effect than with the Webley revolver. Type A, although heavier, was not unpleasant to shoot. The cartridges supplied were too long to be chambered automatically, so the test was not completely satisfactory. On the subject of stopping power, Gabbett-Fairfax stated that he considered unjacketed hard lead bullets to be impractical. He had already made several experimental automatic pistols chambered for the .455 (11.5mm) service revolver cartridge (with a black powder charge) and had good results, but he had employed a special loading angle with the magazine that was not suitable for a service pattern.

At this stage of the testing, the director general of ordnance expressed his view that the Mars should be considered for troop trials. The committee, however, believed that they had insufficient experience with it and that further tests should be conducted at Hythe and Whale Island with 2,000 rounds of ammunition at a muzzle velocity of not more than 350 meters per second. HMS *Excellent* staff received the Mars pistols for these additional trials on 27 September 1902. The five officers and four enlisted men who tested the gun on Whale Island reported that it was unpleasant to shoot. Their report drew attention again to the empty cases that hit the firer in the face, the complicated mechanism with its tendency to jamming, and the weight and general unhandiness of the weapon. They judged the handgun unsuitable for the navy. The director of naval ordnance considered further trials unnecessary, but the Small Arms Committee waited for the Hythe report on trials carried out from July through November 1902.

In the accuracy tests at Hythe at 23, 46, and 92 meters,

a Webley revolver using Mark III ammunition secured better results than the Mars. In the rapid-fire test, the Mars fired faster and obtained a higher score. All misfires experienced in these tests were caused by the breech's failure to close. In tests held on 28 October, the Gabbett-Fairfax representative removed a burr that was causing jamming; but 25 rounds later the elevator broke, and the pistol had to be taken away for repair. On the 410th round after the resumption of firing, the left cocking handle broke. Shooting continued even though loading was difficult. On the 817th round, the right handle broke, making further firing impossible. In all, total ammunition and mechanical failures came to a significant total. In addition, the trigger pull and recoil were still too heavy, and the empty cartridge cases still struck the shooter.

The Small Arms Committee put off final recommendations on the Mars pistol pending receipt of a new, smaller model pistol in .45 caliber (11.43mm) that used a 14.3-gram projectile, obtaining a velocity of 290 meters per second. On 20 January 1903, Gabbett-Fairfax wrote to the director general of ordnance and asked for £1,000 ($4,866.50) from public funds to help cover his expenses on the .45 caliber series, which he said had already cost him £2000 ($9,773.00). A second letter of 27 January repeated this request and asked that a shooting exhibition of his handgun be held before the committee. The small arms group recommended that such an exhibition be given in London on 16 February, but did not address the matter of a grant. Gabbett-Fairfax duly carried out his exhibition at Wormwood Scrubs prison grounds in the presence of most of the members of the Small Arms Committee. This exhibition included .45 caliber (11.43mm) pistols of both the large and pocket patterns. The next month on the 2d, Gabbett-Fairfax quoted the committee a price for a supply of Mars pistols in minimum lots of 500. Unable to accept a quotation, the committee members agreed to see that further trials be carried out with the smaller pattern pistol if it were submitted to them. This is the last reference in the records of the Small Arms Committee to the Mars pistol or its inventor.

Hugh Gabbet-Fairfax faced debts and defeat. Although he held patents for other inventions—engines and power transmission mechanisms—profits from these ventures were not enough to cover his losses on developing the Mars pistols and submitting them to a seemingly never-ending series of trials from which little positive came. According to the October 1903 issue of *Arms & Explosives:*

> The usual bankruptcy notice has been issued with reference to the affairs of Mr. H. W. Gabbett-Fairfax. The cause of failure is attributed to delays incidental to obtaining order of assurance from H. M. War Department, leading to the seizure of the patents by the mortgagees. The statement of affairs seem to show that the debtor mainly carried on his experiments with the aid of borrowed money, and no practical results were forthcoming. The losses incurred are mainly attributed to the difference between the amount at which the patents were formerly valued and the sum for which they were mortgaged.[11]

Even after the personal declaration of bankruptcy, the Mars Automatic Pistol Syndicate, aided by Clement Brown, a former associate of Gabbett-Fairfax, continued work on the Mars pistol, possibly still hopeful of interesting the British or French governments. On 9 December 1905, the company and engineer Brown applied for a patent on an improved version of the 1900 model. The new handgun was manufactured by various small Birmingham concerns and placed on the commercial market in 1906, but it never became a sales success, and by the end of the following year it was no longer being made. As was so often the case in the private, individual sponsorship of a new product by its inventor, the lack of sound financial backing hindered the development of the Mars pistol. But of greater significance was the fact that the handgun was too powerful and too complicated to be acceptable to the British ordnance authorities.

Colt

The Colt Patent Firearms Manufacturing Company also tried to sell their Browning-designed pistols to the British in the first years of the twentieth century. In December 1902, Colt wrote to the Small Arms Committee, saying that they were willing to submit an automatic pistol in .38 caliber (9.7mm) that fired an 8.4-gram bullet. While they were unable to submit a .45 (11.43mm) handgun embodying the requirements in the committee's letter to Colt of 20 August, the .38 (9.7mm) model had improvements that had not been incorporated in the Colt automatic then being sold. At a committee meeting attended by a Colt representative, it was agreed that 1000-round firing trials would be held at Enfield, Hythe, and Whale Island; and the Colt would be evaluated.

In January 1903, the chief inspector of small arms reported on the Colt pistol, nominally of .38 caliber (9.7mm) (but actually 9mm), which had been tested in the presence of a gentleman from Colt. First, 40 rounds were fired for accuracy, and the results were fair—not as good as a good revolver, but acceptable for service needs. Five rounds were fired to measure the projectile's penetration: with the results being 12 to 14 12.7-millimeter pine boards. After that, 48 rounds were fired as quickly as possible to test the working of the mechanism. This was followed by a sand test, during which 32 rounds were fired without misfires or jams.

Altogether 125 rounds were fired without mishap, and it was the opinion of the chief inspector that this was the best automatic pistol tested to date by the British. The report from Hythe in February showed that the Colt's accuracy was inferior to the Webley's in deliberate fire, but that the Colt's performance in rapidity combined with accuracy was better. To test the mechanism, 160 rounds had been fired, and apart from three failures to extract there were no faults. In all, 359 rounds were fired at Hythe with no further faults.* The ammunition used in this trial was an 8.4-gram bullet with a nickel-plated copper jacket. The charge was .42 gram, and the velocity at 13.7 meters was 315 meters per second. Colt was asked to produce a pistol conforming to the usual committee specifications. In March 1903, the American manufacturer stated that they were not yet in a position to produce the larger caliber pistol demanded by the British, and it was not until 1906 that further trials of a Colt handgun design were made.

In January 1906, the chief inspector of small arms reported

*Apparently, the staff at HMS *Excellent* did not test the Colt at this time.

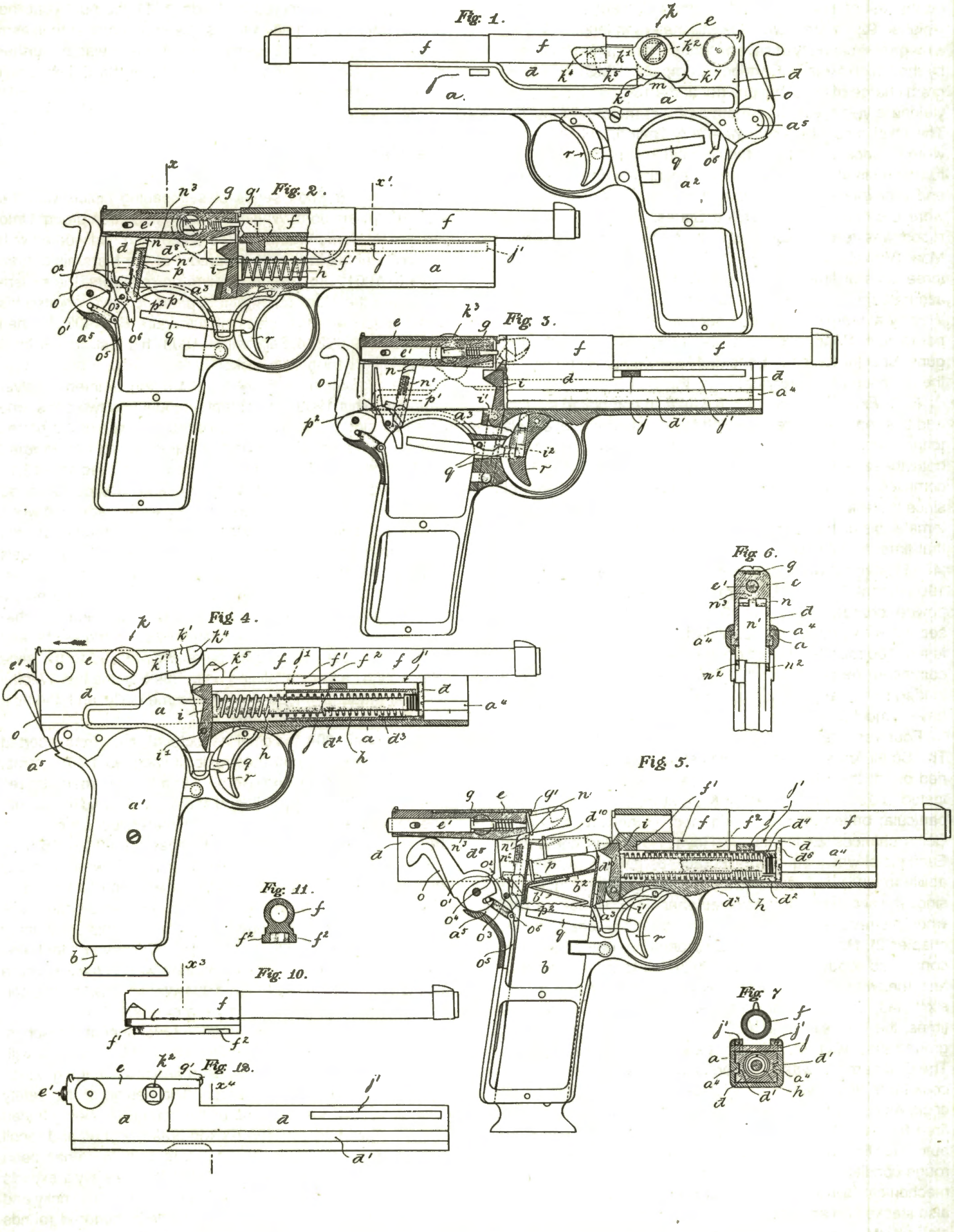


FIGURE 11–8. British patent (19,032 of 1903) drawings describe the Webley experimental self-loader of 1903. *(British Patent Office)*

on the test of a .45 caliber (11.43mm) Colt automatic, which weighed 921 grams, was 203 millimeters in length, and had a magazine capacity of seven rounds. The ammunition, made by the Union Metallic Cartridge Company (UMC), had a .32-gram charge of bulls-eye powder and a 13-gram bullet, which yielded a velocity at 13.7 meters of 252 meters per second. The chief inspector's trial was very limited, but the results were so encouraging that the committee was moved to order further tests at Hythe. As a result, six pistols (three for Hythe and three for HMS *Excellent*) and 2,000 rounds of ammunition were ordered from the United States. By June, the Hythe report was ready, based on trials carried out against three Mark IV Webley revolvers. Of 917 rounds, there were only three jams of any sort in the Colt. It was found to be more accurate than the Webley at all ranges. In the speed test, the Webley averaged 12 rounds per minute, the Colt 22 rounds per minute. Penetration was about the same for both handguns. Specialists at the School of Musketry at Hythe did note the absence of a safety catch on the Colt.

HMS *Excellent's* evaluation was also completed by June, and this report declared the Colt to be superior in every way to the Webley revolver. The Small Arms Committee received both these reports and noted that the .45 (11.43mm) Colt complied with practically all their necessary conditions, but since there was no immediate official requirement for an automatic pistol the committee deferred taking any action at that time. In July 1910, Colt submitted a new model of their .45 (11.43mm), which was about 57 grams heavier than the 1905 model. It fired a 12.9-gram projectile, using a .38-gram powder charge. Velocity at 13.7 meters was 285 meters per second with ammunition provided by Winchester. A check test of 100 rounds showed no mechanical problems, and the committee reported that this pistol, like the 1905 Colt self-loader, met nearly all their requirements except that it did not have a mechanical safety.

Four years later the Colt was still being tested in Britain. The Small Arms Committee was shown reports of trials carried out at the HMS *Excellent* between the Colt of the type tested in 1906 and a Webley & Scott automatic. It was this particular battery of tests performed by the navy that killed Colt's chances as far as the Royal Navy was concerned. Each pistol was judged on accuracy, certainty of action, and ability to withstand rough use during a 770-round trial. Ever since the accidental death of Lieutenant H. E. Rooper in 1886 when his revolver fell out of its holster and discharged (see chapter 2), Royal Navy ordnance personnel had been very concerned about the overall safety of handguns. In the critical test, the two pistols at full cock were dropped on soft ground six times. The Colt hammer was released on impact four times, the Webley not at all. The test was repeated on hard ground six times from belt height and six times from 2 meters. The Colt hammer was released eight times and went to half-cock three times, while the Webley's hammer stayed on full cock. As a result of its being dropped, the next seven rounds fired from the Colt were fired at full automatic. Neither the automatic fire nor the hammer's inability to stay cocked under rough conditions made the Colt popular with the navy. Four mechanical failures and a great number of failures to feed also stacked up against the American-made pistol. While the staff at HMS *Excellent* went on to perform a salt-water test with the Colt, the navy had clearly lost interest in the design; and when Colt submitted its Model 1911 the next year the Small Arms Committee in turn showed no great enthusiasm in evaluating it. After December 1911, there was no further mention of Colt designs in the records of the British Small Arms Committee.

Webley & Scott

The Webley & Scott series of self-loading pistols was the work of William John Whiting. Whiting had been brought into the firm by Henry Webley (1846–1920) and had worked with Gabbett-Fairfax in the development of the Mars pistol from 1899 to 1901. Brought up working on revolvers, the experience with the Mars automatic appears to have whetted his appetite for this new class of handgun. By 1903, he had patented (19,032, 4 September 1903) his first design for a self-loading handgun, a locked-breech weapon designed to fire the regulation .455 caliber (11.5mm) rimmed revolver cartridge. This 1903 experimental model had two arms, one on either side of the slide that locked the slide to the barrel; cams—humps machined on the frame—lifted and lowered these arms. After the barrel and slide had recoiled about 3.18 millimeters, the locking arm was lifted, and the slide continued to the rear. Only a few of these models were made, and when they failed to be satisfactory Whiting turned to another design.

There were three distinct 1904 Whiting-Webley models (patents 3,820, 16 February 1904; 17,856, 17 August 1904; 25,028, 17 November 1904), all similar in operating mechanisms, but with different recoil, trigger, and sear mechanisms. All had three main assemblies—frame, slide and breech, and barrel—and the barrel was locked to the slide assembly by a vertical sliding bolt. This was the first Webley & Scott-made self-loader sold commercially and the first tested by the British military.

In October 1904, the chief inspector of small arms reported on the Webley & Scott automatic. It weighed 1,403 grams, was 260 millimeters long overall with a 165-millimeter barrel, was fitted with a safety bolt, and sported a 7-round magazine. The velocity at 13.7 meters was 316 meters per second, and the projectile penetrated 13 to 15 boards (169 to 195 millimeters plus airspaces). Two types of bullets were supplied for the rimmed cartridges—a soft-nosed type of 14.5 grams with a charge of .59 gram of cordite, and a solid-nosed type of 15.2 grams with .56 gram of cordite. In this preliminary test, 131 rounds were fired without misfires, even after being immersed in sand, and the committee was in favor of more extensive testing of the Model 1904 Webley. Ten pistols and 10,000 rounds of ammunition were ordered.

By the spring of 1905, ordnance personnel at the School of Musketry were recommending that any further trials with the Webley & Scott automatic be abandoned on the grounds that it was extremely dangerous. The design of the safety catch was very suspect, and of the five pistols being tested at Hythe, two had suffered broken buffer springs and recoil levers early in the shooting. Of 350 rounds, there had been 56 failures or jams. In September 1905, the navy's experts reported on this model and likewise found the pistol risky and the safety catch unreliable. In the several hundred rounds they had fired, the pistol had jammed 42 times. In spite of the pistol's early promise, the Small Arms Committee had to

FIGURE 11–9. The Webley & Scott .455 (11.5mm) Automatic Pistol of 1904–05 (serial number 17) measured 258.5 millimeters overall with a 166-millimeter barrel (rifling twist 7-right) and weighed 1,374 grams. It was recoil operated and employed the Whiting vertical bolt system of locking. This self-loader used a seven-shot box magazine. *(Krcma)*

FIGURE 11–10. Disassembled view of the Webley & Scott .455 (11.5mm) Automatic Pistol of 1904–05 (serial number 17). ***(Krcma)***

inform Webley & Scott that their design was unsatisfactory.

In April 1909, Webley & Scott submitted another model for trial, a 9mm handgun, weighing about 985 grams, measuring 203 millimeters overall, and having an 8-round magazine. The bullet weighed 7 grams with a .34-gram charge; muzzle velocity was measured at 313 meters per second, and penetration at 22.8 meters was 13 boards. Although the new weapon was recoil operated, it was not positively locked at the moment of discharge. It was a blowback type. It is believed that the 9mm cartridge used with the 1909 design was the 9mm Browning Long. The Small Arms Committee again found the safety arrangements unsatisfactory, and in addition noted that the magazine catch was prone to let the magazine fall out. The pistol jammed three times during a normal fire test, with another two jams after the sand test. The committee took no further action.

By 1909, the designers at Webley & Scott had reworked the .455 caliber (11.5mm) automatic. When the new pistol was fired, the slide was driven to the rear. On the inside of the frame and the outside of the barrel, there were matching diagonal grooves and projections respectively. These diagonals translated the rearward movement of the slide into a downward and unlocking motion for the barrel. A preliminary trial was carried out by the staff of HMS *Excellent*, who reported in September 1909. Their evaluation resulted in changes being made in the position of the safety catch, in the magazine holder, and in the trigger "pull-off." These alterations called for new tests, which took place at Whale Island on 19 October. This particular test phase consumed 1,254 rounds of ammunition, and of the total there was one mechanical failure, three cases of blown primer, and five jams due to the magazine spring fouling. These jams occurred after the pistol had been fired 750 times without being cleaned. In the durability test, the Webley automatic was dropped six times on hard ground from waist height at full cock and was thrown into the air five times and allowed to fall on hard ground; throughout these tests the pistol stayed cocked. It also passed a water test and a frost test. It was rated more accurate than the Webley revolver.

The Webley self-loader weighed 1,417 grams; with a .455 (11.5mm) bullet weighing 14.3 grams the projectile achieved a velocity at 9 meters of 291 meters per second (charge was .55 gram of cordite). Experts at the HMS *Excellent* believed that the new Webley showed considerable merit and was superior to the standard issue revolver. The *Excellent's* chief urged that it be issued among the Home and Atlantic Fleets for further trial, with a view toward adoption. He also suggested that the sights be altered slightly, that the magazine be more securely locked in place, and that the magazine bottom be perforated to allow the escape of water and dirt.

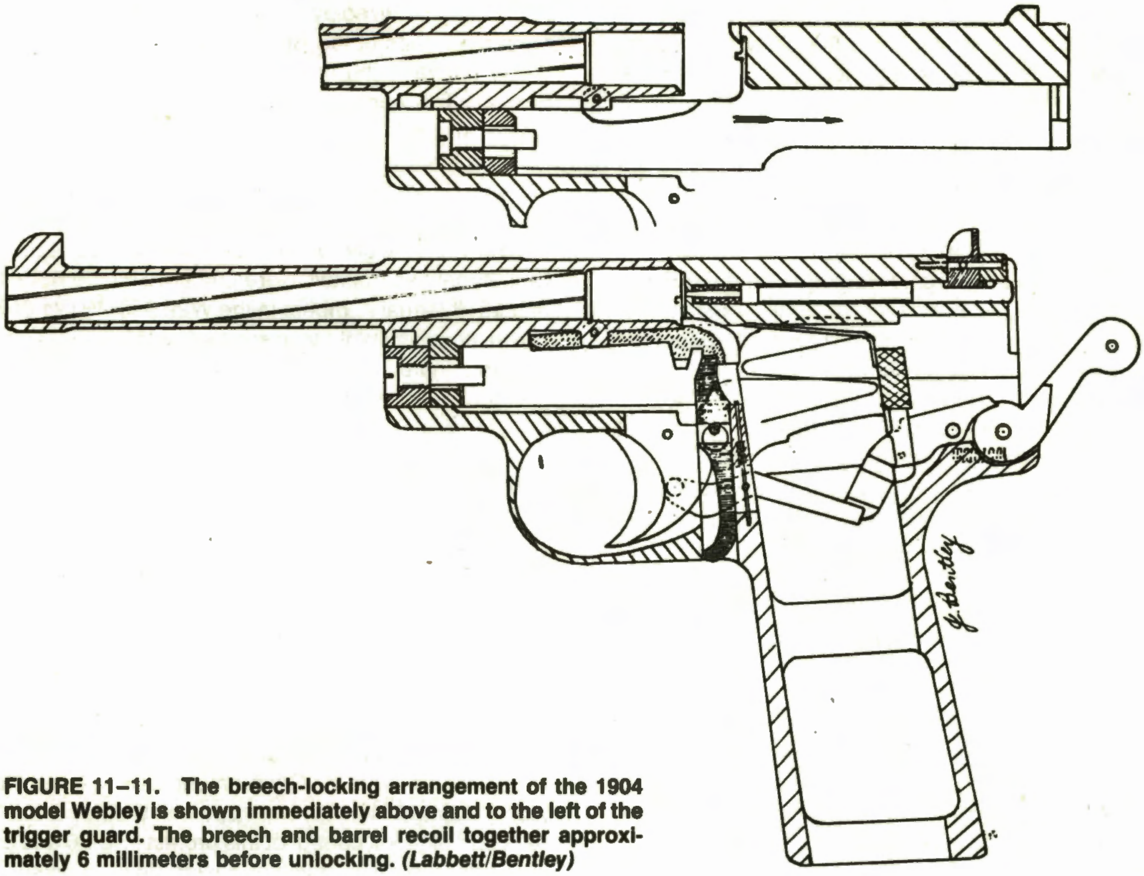


FIGURE 11–11. The breech-locking arrangement of the 1904 model Webley is shown immediately above and to the left of the trigger guard. The breech and barrel recoil together approximately 6 millimeters before unlocking. *(Labbett/Bentley)*

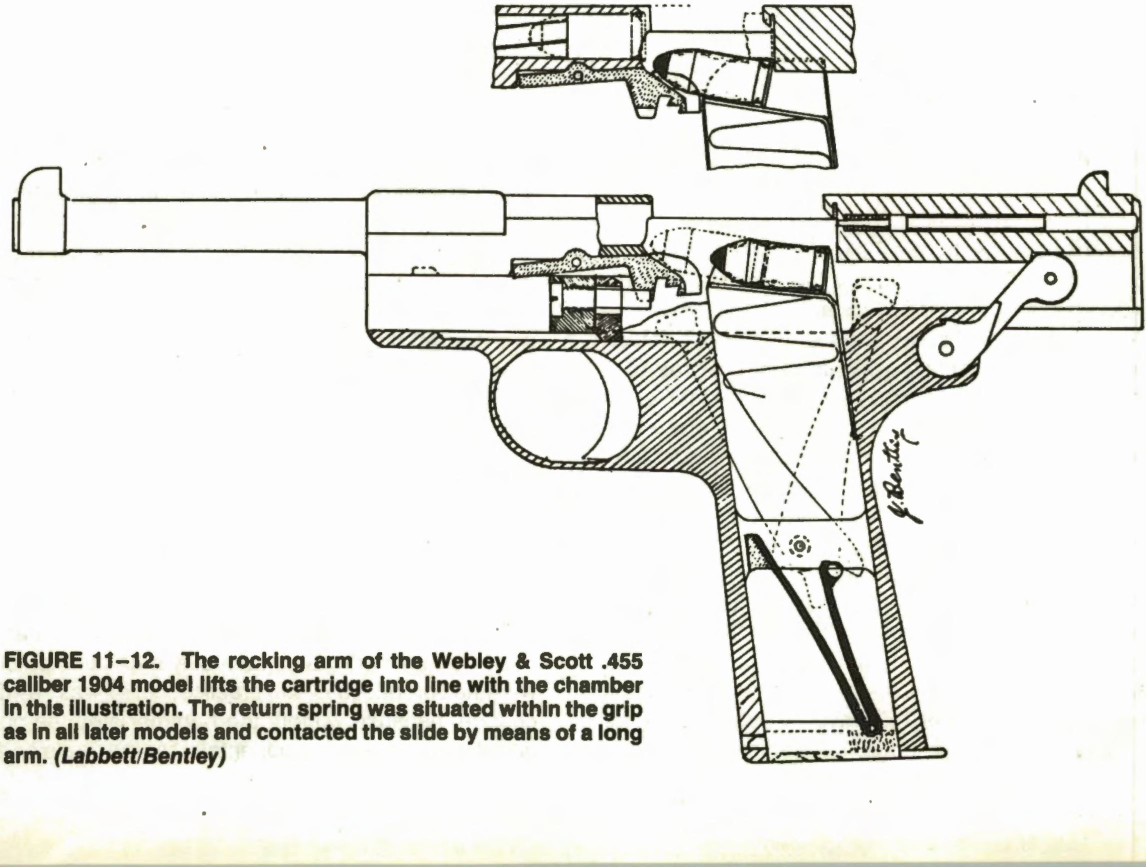


FIGURE 11–12. The rocking arm of the Webley & Scott .455 caliber 1904 model lifts the cartridge into line with the chamber in this illustration. The return spring was situated within the grip as in all later models and contacted the slide by means of a long arm. *(Labbett/Bentley)*

The Small Arms Committee sent this handgun to the chief inspector of small arms to establish if the objections raised to the earlier model had been overcome. In March 1910, the chief inspector reported that the safety catch was still fundamentally unsuitable for use with a holster. He also noted that the breech slide was locked to the barrel at the moment of discharge. The committee accepted these opinions but allowed further trials to take place with the Webley automatic and the Colt in September 1910 at Whale Island. These tests showed the Webley to be the safer handgun, and the Royal Navy stated a marked preference for the British design, recommending it for adoption. The chief inspector suggested that Webley & Scott submit a similar but lighter pistol for land service trials with a six-round magazine. By 1912, Webley's automatic had been adopted by the navy, but it was not intended to replace the revolver, only supplement it. The official designation for this handgun was the rimless *.455 Pistol, Self-Loading Mark I, 1912.* Webley & Scott produced these pistols for the navy in 1913.

Some time after 1913, a modification of the naval-type pistol was tried at Enfield. It had adjustable sights and was fitted with a locking bolt, although in general appearance it resembled closely the earlier model. It was later designated the Mark I, No. 2 Pistol.

In June 1912, the Small Arms Committee recommended the issue of 100 .455 (11.5mm) Webley & Scott automatics to the Royal Horse Artillery for troop trial. Issued to a select battery, 50 were equipped with shoulder stocks. The trial was made with a view toward the eventual adoption of this pistol as the personal weapon of the members of Royal Horse Artillery. Although the Webley self-loader performed admirably, the British ground forces decided to keep their revolvers, a decision that accounts for the huge quantities of Webley revolvers made during the First World War. In April 1915, however, the automatic was approved for issue to Royal Flying Corps flight personnel, but this issue lasted for only one year.

WORLD WAR I, 1914 TO 1918

By far, revolvers were the more widely used side arm among the British army on the battlefields of the First World War. More than 300,000 Mark IV .455 (11.5mm) Webley revolvers were made by Webley & Scott for the British armed forces during the war. Supplementary revolver contracts (as of 8 November 1915) were placed with two Spanish small arms manufacturers, Garate y Compañia and Trocaola, Aranzabal y Compañia, both of Eibar, for 680-gram double-action .455 (11.5mm) revolvers with 127-millimeter barrels (see chapter 2). These Spanish-made arms were called the *Pistol, OP* (Old Pattern) *No. 1 Mark I* (Garate y Compañia) and *Pistol, OP No. 2 Mark I* (Trocaola, Aranzabal y Compañia). The exact number of handguns made in Spain for Britain is unknown. Between September 1914 and September 1916, the British also acquired revolvers from the United States. The government bought Smith & Wesson Ejector First Model (5,000) and Second Model (69,755) revolvers chambered for the .455 (11.5mm) Mark II cartridge. Foreign contracts were terminated as Webley & Scott's production levels rose to meet the needs of the British forces.

By contrast, the number of self-loading pistols acquired by the British was very small. It has been variously estimated that between 8,050 and 10,500 .455 (11.5mm) Pistol, Self-Loading Mark Is were produced at Webley & Scott. Up to as many as 5,500 went to the Royal Navy, and about 2,500 were delivered to the Royal Flying Corps. Another 1,250 to 2,500 were sold on the civilian market. About 10,000 .455 (11.5mm) Colt Model 1911 pistols were procured by the British in 1915 and 1916 (serial numbers in the W29,000–W124,000 range). Again, acquisition of these supplementary self-loading pistols was terminated once Webley & Scott began producing sufficient quantities of revolvers.

THE INTER-WAR YEARS

After the war, the British War Office announced that the revolver would remain the standard handgun of the army. In 1922, the development of a lighter revolver with a small caliber was approved, but the bullet had to have stopping power nearly equal to the .455 (11.5mm) ammunition. Webley & Scott was commissioned to carry out these experiments, and over the next five years the firm produced a series of prototype models patterned after their .38 (9mm) Mark III—not to be confused with the Government Mark III—and the military .455 (11.5mm) Mark IV. Unhappy with Webley & Scott's progress, Enfield took control of this project in 1926 and continued to modify the basic revolver design until an acceptable one was approved—the *Pistol, Revolver, .38 No. 2 Mark I.* This .38 (9mm) Webley Special caliber revolver fired a 13-gram lead projectile, which had a muzzle energy of 200 joules. To satisfy the Geneva Convention requirements, the British, in 1938, substituted a 12-gram nickel-jacketed bullet for the lead bullet.

The .38 caliber (9mm) Enfield No. 2, Mark I revolver was well received by most British military users, with the exception of the Royal Tank Regiment. Officers of the armored forces complained that the hammer spur caught on the interior surfaces of their tanks when crew members tried to enter or exit their vehicles. As a consequence, the *Pistol, Revolver, .38 No. 2 Mark I** was introduced on 22 June 1938.

Basically the same as the No. 2 Mark I, the thumb spur and single-action notch on the hammer were removed so that the pistol could be fired double-action only. The mainspring was altered so as to reduce the trigger pull from 6.5 to 7.5 kilograms to 5.5 to 6.5 kilograms. The Mark I* had a new pattern grip plate to make the pistol easier to hold and fire (fig. 11–21).

WORLD WAR II, 1939 to 1945

On 29 July 1942, the Mark I**, on which the hammer stop had been omitted, was introduced in an attempt to speed up wartime production. In practice, this was a dangerous change, because without the hammer stop the pistol would go off when dropped accidentally. At the war's end, Mark I**

FIGURE 11–13. The Webley & Scott .455 Pistol, Self Loading Mark I 1912, as adopted by the British Navy (serial number 3364). Weighing 1,120 grams, this recoil-operated pistol was 215 millimeters long with a 127-millimeter barrel (rifling twist 6-right). A 7-shot box magazine was standard. *(Krcma)*

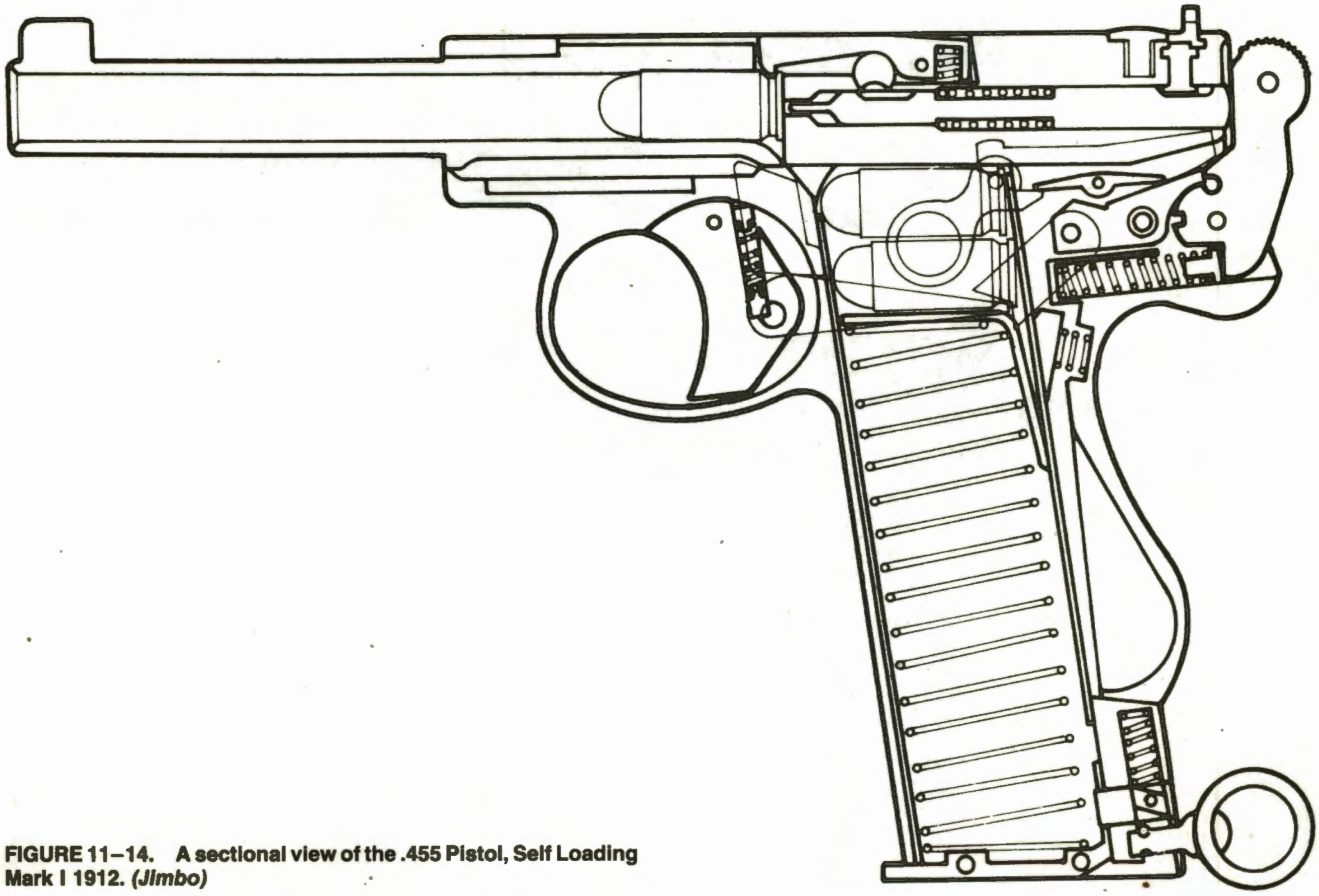
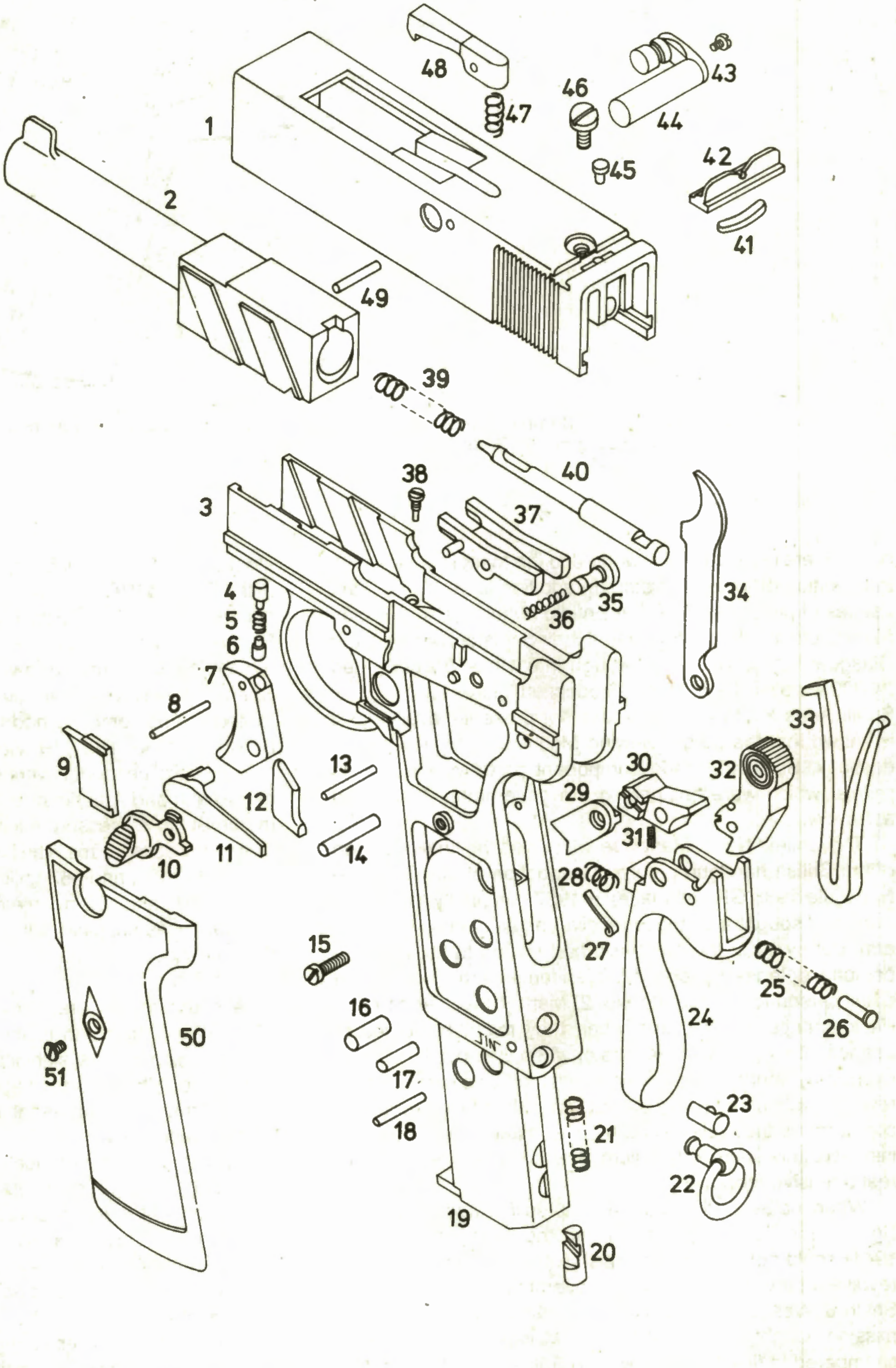


FIGURE 11–14. A sectional view of the .455 Pistol, Self Loading Mark I 1912. *(Jimbo)*

FIGURE 11–15. Two views of the .455 Pistol Self Loading Mark I, No. 2, as issued to the Royal Flying Corps. Note the safety catch in the top picture and the unique recoil spring in the lower view. *(Krcma)*



1. Slide assembly
2. Barrel assembly
3. Frame (receiver)
4. Trigger plunger
5. Trigger spring
6. Trigger plunger
7. Trigger
8. Trigger pin
9. Trigger side plate
10. Safety lever
11. Trigger bar
12. Trigger auxiliary lever
13. Slide hold-open lever pin
14. Grip safety assembly pin
15. Sear and sear bar screw
16. Sear pin
17. Hammer pin
18. Lanyard swivel pin
19. Magazine
20. Magazine catch release
21. Magazine catch spring
22. Lanyard swivel
23. Magazine catch
24. Grip safety
25. Hammer spring
26. Hammer spring plunger
27. Sear bar spring
28. Grip safety spring
29. Sear bar (tail)
30. Sear
31. Sear spring
32. Hammer
33. Recoil spring
34. Recoil spring lever
35. Recoil lever stop
36. Recoil lever stop spring
37. Slide hold-open lever
38. Recoil lever stop screw
39. Firing pin spring
40. Firing pin
41. Rear sight pin
42. Rear sight
43. Breech stop screw
44. Recoil lever bar and breech stop
45. Firing pin retainer
46. Rear sight screw
47. Extractor spring
48. Extractor
49. Extractor pin
50. Grip plate
51. Grip plate screw

FIGURE 11–16. Exploded view of the Webley & Scott .455 Pistol, Self Loading Mark I 1912. *(Jimbo)*

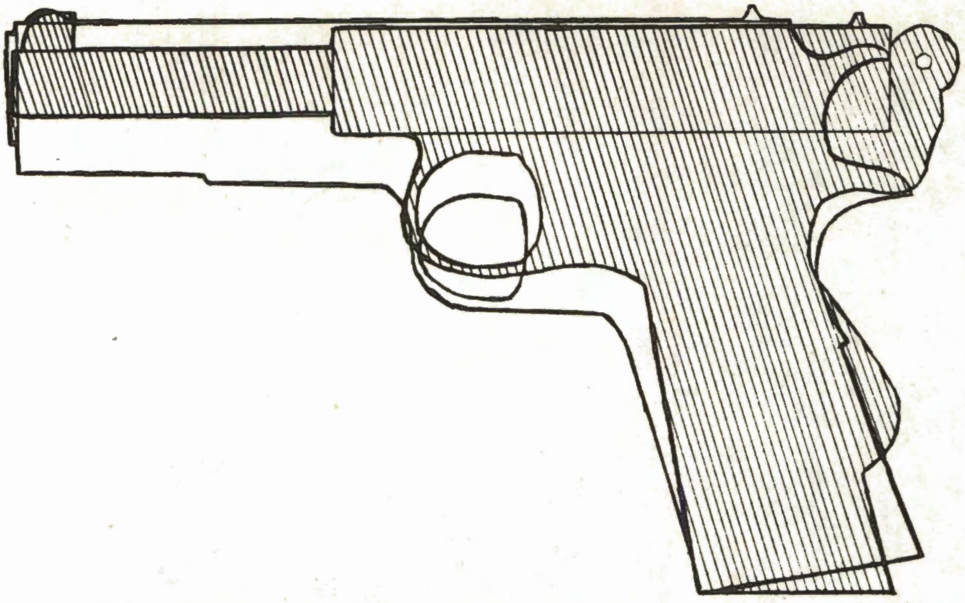


FIGURE 11–17. Comparison of Webley & Scott .455 self-loading pistol and the Colt .45 Model 1911 self-loading pistol. ***(Hatcher)***

pistols were recalled and reworked to the Mark I* pattern with the addition of a hammer stop. In addition to the No. 2 Mark I series of pistols produced at Enfield during the war, Albion Motors, Ltd. made this revolver at their Scotstoun Works near Glasgow from June 1941 through late 1943. An estimated 24,000 were made by Albion. Production figures for the Royal Small Arms Factory, Enfield, are not presently available. It is known that the Singer Sewing Machine Company at Clydesbank, Scotland, made component parts for the Enfield pistols, which were shipped to the government factory for assembly.

The Enfield No. 2, Mark I* revolver was the final evolution of the British handgun before the adoption of the Frabrique Nationale 1935 GP self-loader in 1957. Originally the British army had sought a cartridge revolver as an offensive cavalry arm, but by 1938 the emphasis had shifted to its use as a personal defense weapon. Armored forces, artillerymen, and other personnel carried the No. 2, Mark I* revolver as extra life insurance for that time when they might be forced to abandon their primary weapons or when their positions were overrun by enemy troops. Many British officers carried these revolvers into combat as well, but unlike their First World War counterparts they relied on a more substantial weapon—for instance, the 9mm Parabellum Sten submachine gun—for real offensive firepower.

When the Second World War erupted in Europe, the Royal Small Arms Factory in Enfield and the Albion works (from 1941) could not supply the British with the great number of revolvers they required, so the government again turned to Smith & Wesson in America. The British Purchasing Commission bought Smith & Wesson's Military & Police model, chambered to fire the low-powered British .38/200 cartridge, a variant of the .38 (9mm) Smith & Wesson round. The 13-gram bullet had a muzzle velocity of only 192 meters per second and muzzle energy of only 225 joules, roughly equivalent to the .38 (9mm) Enfield round then in use. Production of the Smith & Wesson No. 2 Revolvers (essentially the same gun as the Military & Police Model) began on 11 March 1940. By the following September, nearly all of Smith & Wesson's production was directed toward filling the British order, and when production was terminated on 29 March 1945 this United States company had built 568,204 handguns for the British. Another 811,119 Victory Models, a variant of the Military & Police model, were used by personnel of the Commonwealth and American armed forces. In total, over 1.125 million Smith & Wesson revolvers were issued to British and Commonwealth troops. The No. 2 revolver was manufactured with 102-, 127-, and 152-millimeter barrels, while the Victory came in 61- and 102-millimeter versions. Prior to April 1942, the No. 2 was supplied with a brushed blue finish; after that date the No. 2 and the Victory had a sandblasted "Parkerized" finish.

Although there were many minor changes made in these World War II pistols to facilitate their manufacture at Smith & Wesson, only one significant mechanical alteration was introduced. After reports of accidents with dropped revolvers reached the States in the fall of 1944, C. R. Hellstrom, plant superintendent, oversaw the development of a new hammer block. The old hammer block was moved out of position as the hand (pawl) rose to rotate the cylinder. Return of the device to its blocking position was effected by a spring. Excessive dirt or grease could prevent the hammer block from moving, and it could no longer prevent accidental discharges. As modified, the hammer block was connected directly to the rebound slide and was thus forced back into its blocking position by the heavier spring action of the rebound slide. This modified component was incorporated into the Victory Models in December 1944 at serial number V769,000 (all subsequently-made revolvers had serial numbers prefixed with *VS;* some pistols already partly assembled at the time

FIGURE 11–18. Webley .455 Pistol, Revolver, Mark VI. *(U.S. Army)*

FIGURE 11–19. Smith & Wesson .455 revolver made for British armed forces. *(U.S. Army)*

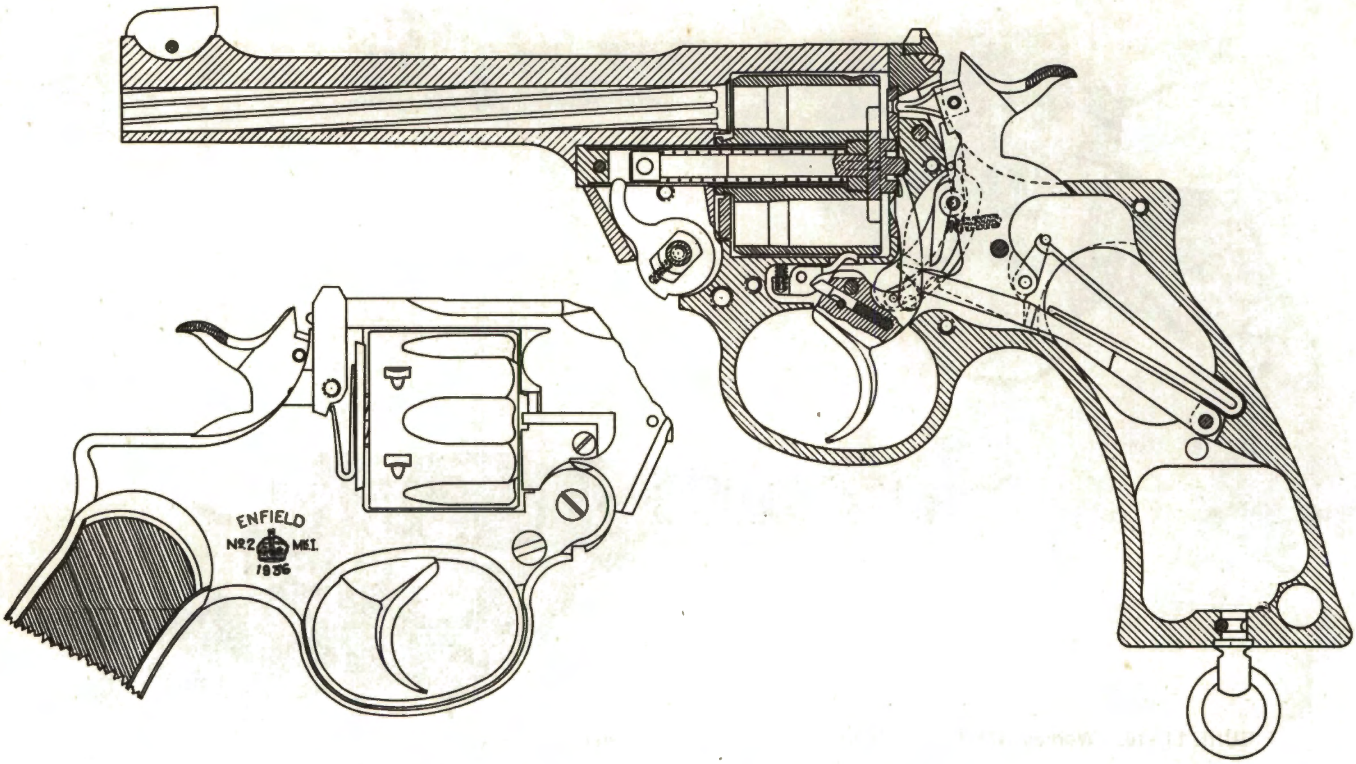


FIGURE 11–20. Enfield Pistol, Revolver, .38 No. 2 Mark I. *(British Army)*

of the modification were marked with an *SV* prefix).

The British did conduct other experiments with handguns during the war, but none reached maturity. One experimental handgun, worthy of note because of its rather unique construction, was referred to simply as *Pistol, Revolver, 9mm.* It was a combination revolver-brass-knuckles-dagger; not a new idea. Taylerson in *The Revolvers, 1865–1888* illustrated a pin-fire dagger-bearing "knuckleduster" designed in about 1870 by one L. Dolne.[12] C. F. Galand and other gunmakers in Liège and Paris made similar revolvers, usually in 6.35mm Browning, before World War I. The World War II-vintage British military version tested in the summer of 1942 was a much more robust device and fired the lethal 9mm Parabellum projectile. Dimensional and weight data are not available, but this five-shot weapon was a potent handful. It was probably intended for issue to commandos and native resistance units operating behind enemy lines. Its failure to be produced in quantity may be attributed to the inexpensive stamped-metal .45 caliber (11.43mm) Liberator pistols being made in the United States for such purposes (see chapter 19).

The 9mm experimental revolver was an instructive venture, however. By mid-war, British small arms experts realized that their next military handgun should be chambered for the 9mm Parabellum round to establish ammunition interoperability with their submachine guns (as had the Americans, Germans, and Soviets). At the 6 November 1944 meeting of the Standing Committee on Infantry Weapon Development, the members present heard Major General T. N. F. Wilson, director of infantry, read the recommendations of the Rifle and Machine Gun Subcommittee concerning a suitable "personal weapon" for officers. After considerable debate over the type of weapon this should be—rifle, machine-carbine (submachine gun), or handgun—the subcommittee decided in favor of a handgun: "the personal weapon of the officer should be, subject to satisfactory trials, the self-loading pistol type rather than the pistol revolver type and that of the types already tried the 9mm. self-loading Canadian Mark I* [the Inglis-made FN Modèle 1935 GP] is the most satisfactory."[13] Thirteen years passed before the FN Browning-Saive pistol was officially approved in Britain, but the die was cast in 1944. After 44 years and two world wars, the British military had finally decided in favor of the self-loading handgun. The growing popularity of the 9mm Parabellum cartridge around the World was certainly a major factor in forcing the decision, as was the postwar North Atlantic Treaty Organization's call for standardization. With the adoption of the FN Modèle 1935 GP pistol, all service revolvers were declared obsolete and had been phased out by the mid-1960s.

One final design must be included in our discussion to make this complete. During the Second World War, the Swift Rifle Company of London, primarily known for its manufacture of training aids, made at least two models of the Tarn automatic pistol. Patented by Z. de Lubicz Bakanowski, a Polish exile, this 9mm Parabellum pistol was of the simple blowback type. British test authorities rendered the following test report on the Tarn in April 1945:

> Four samples of this pistol were submitted for examination. This weapon works on a simple blow-back principle without any form of locking. This, combined with the standard 9mm. cartridge, has resulted in the moving parts being very heavy and supported by an abnormally strong return spring. To ensure a sufficient breech seal the return spring is initially compressed about 4 inches [102 millimeters] when the moving parts are forward.
>
> There are no novel features in the design, most of the sys-

FIGURE 11-21. Comparison of *(top)* Pistol, Revolver .38 No. 2 Mark I and *(bottom)* Mark I*. *(Canadian Army and U.S. Army)*

Caliber .38 No. 2 Mk 1 (1*) Revolver

RECOGNITION FEATURES

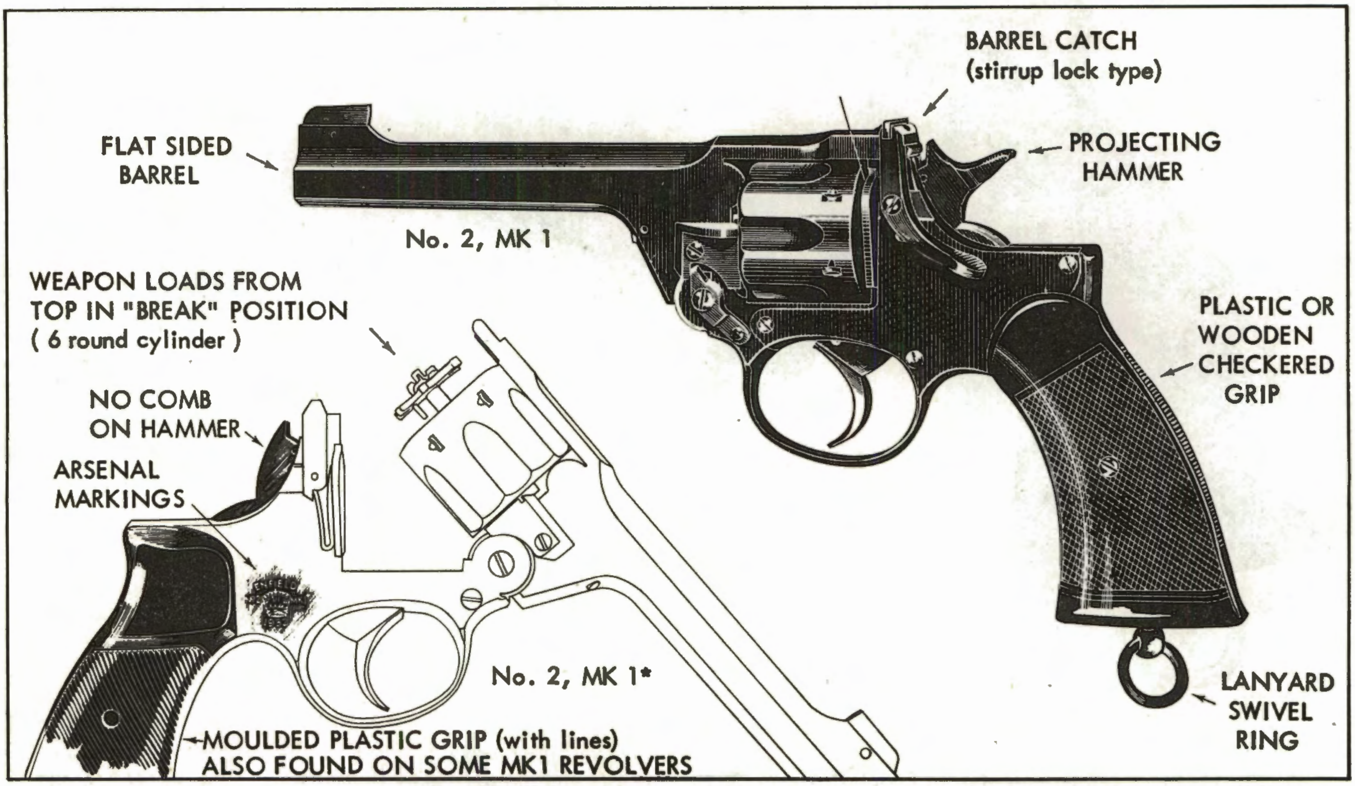


FIGURE 11–22. U.S. Army intelligence recognition drawing for No. 2 Mark I and Mark I* revolvers. Both were chambered to fire 9.7mm (.38 Webley Special) ammunition. Measuring 267 millimeters long with a 127-millimeter barrel (rifling twist 6-right), the revolvers each weighed 980 grams. The standard 6-shot cylinder was employed along with a modified Webley system of locking. ***(U.S. Army)***

tems—trigger, disconnector, striker, etc.—being similar to those used in existing pistols.

The general arrangement of the safety and hammer axis is poor and requires a great deal of care in assembly to ensure that both members are operative. Finish and workmanship on the four samples submitted is extremely poor. The pins securing the barrel are very soft, as are all the other axis pins in the pistol.

Manufacture has been simplified by making the breech and top slide as two separate components keyed together by a heavy cotter [pin]. This principle can be applied to most of the existing self-loading pistols, if required.

Several rounds were fired to test the action, which was shown to be very violent. Accuracy was of a low standard. The pistol is extremely difficult to re-cock after a misfire or at the commencement of firing.[14]

The Tarn pistols were returned to the manufacturer, together with the negative reports. With the war drawing to a close and the increasing interest by the British in the Fabrique Nationale Modèle 1935 GP, this project was apparently dropped.

NOTES

This chapter was based on the following sources:

Dowell, William Chipchase. *The Webley Story.* Kirkgate, Leeds: Skyrac Press, 1962.

Labbett, Peter. "British Automatic Pistol Trials, 1900–1914," *Gun Review,* (Aug. 1964): 307–10; (Sept. 1964): 333–36; (Oct. 1964): 369–72.

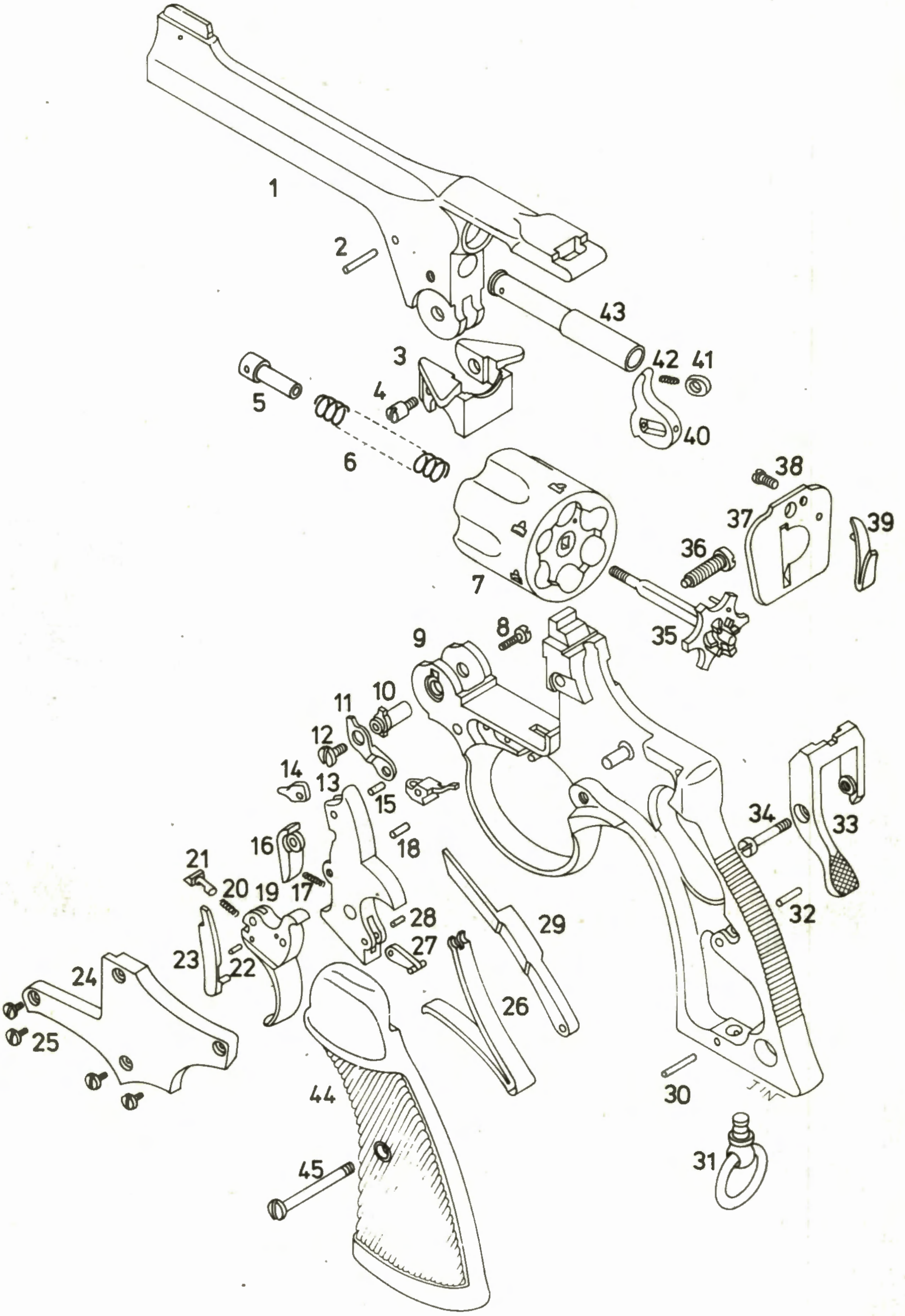
Labbett, Peter. "British Military Handguns 1900–1945," material drafted for this book, London, 1978.

Sterett, Larry S. "Mars Automatic Pistols," *Gun Digest, 1961.* (1961):121–29.

Stonley, Jim. "The .455 Automatic Pistol in the British Services," *Gun Digest* (Dec. 1978): 728–30, 732; (Jan. 1979): 20–24; (Feb. 1979): 90–92.

Taylerson, A. W. F. *The Revolver, 1889–1914.* New York: Crown Publishers, Inc., 1971.

Walter, John. *Luger: An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present Day.* London: Arms & Armour Press, 1975, pp. 57–60, 62–63, 87.



1. Barrel
2. Cylinder pin retaining pin
3. Cylinder retaining cam
4. Cylinder cam screw
5. Extractor nut
6. Extractor spring
7. Cylinder
8. Hinge pin screw
9. Frame
10. Hinge pin
11. Cam lever
12. Hinge pin screw
13. Hammer
14. Hammer nose
15. Cylinder stop
16. Hammer catch
17. Hammer catch spring
18. Catch retaining pin
19. Trigger
20. Stop operating catch spring
21. Stop operating catch
22. Stop operating catch pin
23. Hand (pawl)
24. Side plate
25. Side plate screws
26. Main spring
27. Hammer swivel
28. Hammer swivel pin
29. Main spring auxiliary
30. Lanyard swivel pin
31. Lanyard swivel
32. Main spring auxiliary pin
33. Barrel latch
34. Barrel latch screw
35. Extractor
36. Cam lever screw
37. Recoil plate
38. Recoil plate screw
39. Barrel latch spring
40. Extractor lever
41. Extractor lever roller
42. Extractor lever spring
43. Cylinder pin
44. Grip plate
45. Grip plate screw

FIGURE 11–23. Exploded view of the Pistol, Revolver .38 No. 2 Mark I*. *(Jimbo)*

FIGURE 11–24. The Smith & Wesson No. 2 Revolver, as made for the British. It was also called the .38/200 revolver. *(U.S. Army)*

1. U.S. War Department, "Report of Board on Tests of Revolvers and Automatic Pistols," in "Report of the Chief of Ordnance" *Annual Reports,* 1907, vol. 6, (Washington: GPO, 1907), p. 116.

2. John Walter, *Luger: An Illustrated History of the Handguns of Hugo Borchardt and Georg Luger, 1875 to the Present Day* (London: Arms & Armour Press, 1975), pp. 57–58.

3. Small Arms Committee, "Automatic Pistols," Report No. 11 (4 May 1903), p. 2. This document is in the collection of the Pattern Room at the Royal Small Arms Factory, Enfield.

4. Ibid.

5. Walter, *Luger,* p. 62.

6. Larry S. Sterrett, "Mars Automatic Pistols," *Gun Digest, 1961* (Chicago: The Gun Digest Co., 1961), pp. 121–122.

7. Ibid., p. 122.

8. Ibid., p. 123.

9. Ibid.

10. Small Arms Committee, "Automatic Pistols," p. 10.

11. Sterrett, "Mars Automatic Pistols," p. 127.

12. A. W. F. Taylerson, *The Revolver, 1865–1888* (New York: Crown Books, Inc., 1966), p. 94.

13. Standing Committee on Infantry Weapon Development, "Minutes of the 11th Meeting held in room 350, Main Building, War Office at 14:30 hours on Tuesday, 31 October 1944" (6 November 1944), p. 3.

14. Ordnance Board, "O. B. Investigation No. 1,763, 9mm, self-loading pistol, TARN" (13 April 1945), *Royal Small Arms Factory,* Enfield.

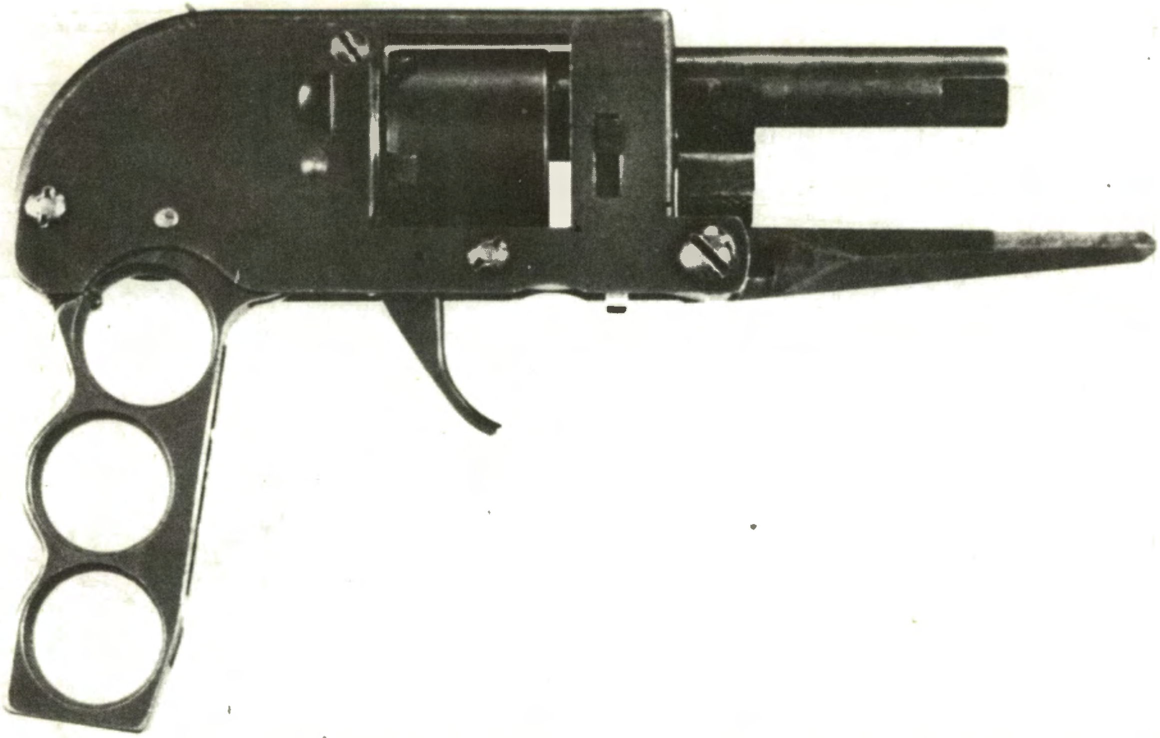


FIGURE 11–25. British experimental 9mm Parabellum revolver, about 1,942. Note that the barrel is longer than one intended for mass production. *(Labbett)*

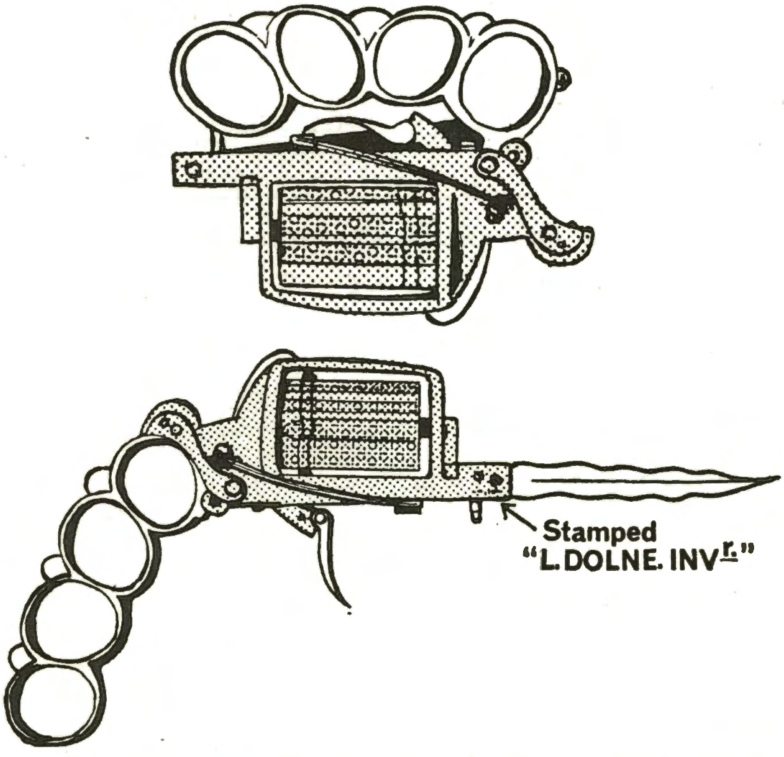


FIGURE 11–26. Mid-nineteenth century pin-fire revolver. Note its similarity to the British experimental revolver (12-29) of the 1940s. *(Taylerson)*

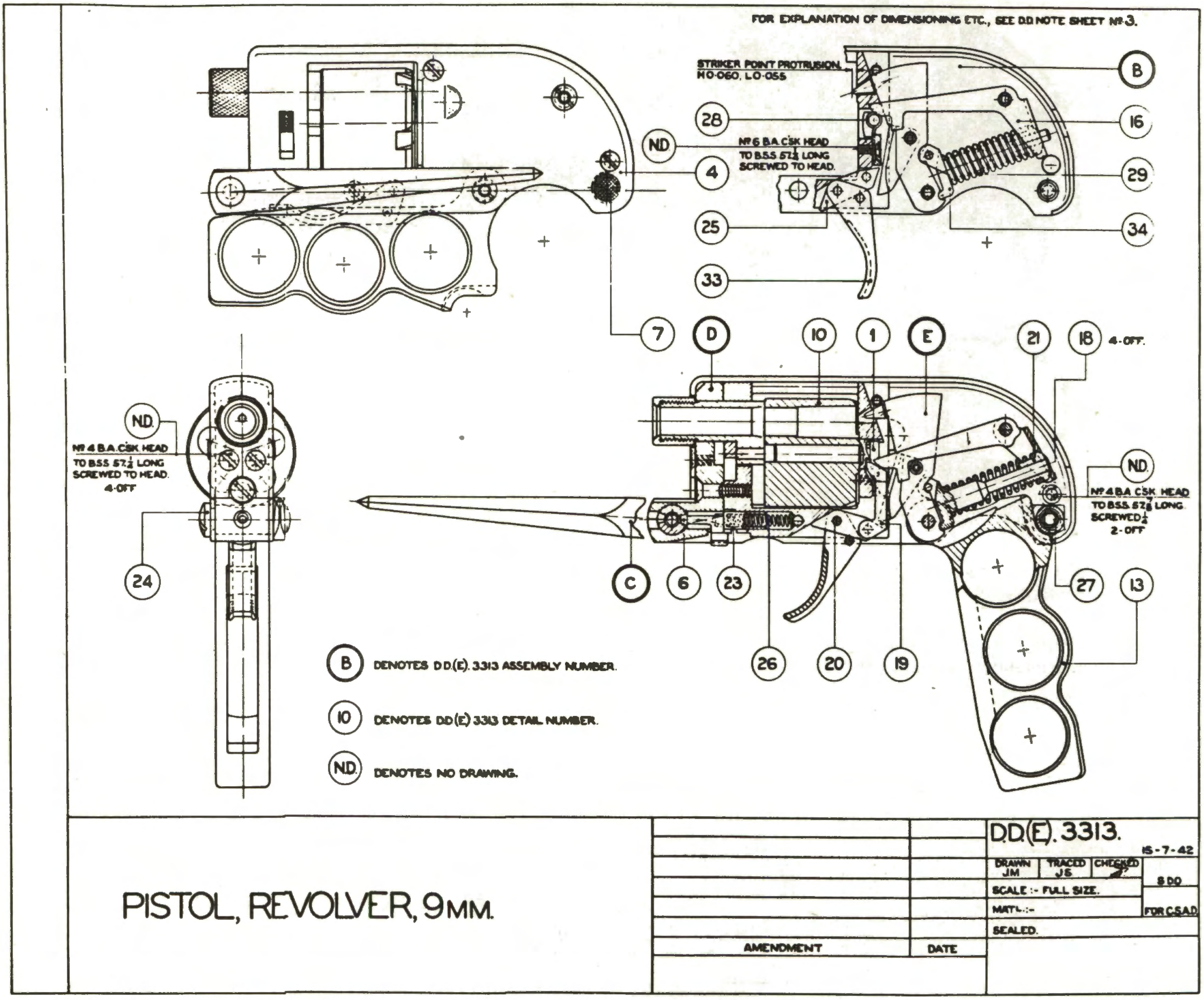


FIGURE 11–27. British experimental 9mm Parabellum revolver. ***(British Army)***

FIGURE 11–28. The 9mm Parabellum Tarn self-loading pistol built by the Swift Rifle Company. *(Krcma)*

12 SOVIET HANDGUNS 1917 TO 1940

Soviet small arms production began shortly after the October Revolution of 1917, which overthrew Kerensky's provisional government. As part of this upheaval, the Bolsheviks sought to control and operate the major Russian weapons factories of Tula, Izhevsk, and Sestroretsk. During the early part of the civil war struggle between Red and White Russian armies, only Tula remained in full production. The equipment from the works at Sestroretsk was evacuated for a time in 1917 and 1918 by the Bolshevik forces when the White Army threatened Petrograd (now Leningrad), while Izhevsk was briefly occupied by White Guard troops. The conflict forced production setbacks at a time when arms were in great demand and supplies were low, having been depleted by the recent war with Germany. In 1916, Tula had produced an average of 60,000 rifles, 15,000 revolvers, and 1,200 machine guns per month, but by 1917 this same group of factories was producing a monthly average of only 10,000 rifles, 2,000 pistols, and 30 machine guns. By the end of 1918, however, levels at Tula and Izhevsk had recovered, but Sestroretsk continued to lag behind. During the bulk of the war, it was the workers at Tula who bore the main burden of supplying the new Red Army. Since one of Vladimir Ilich Lenin's goals for the new union was the creation of a 3-million-strong armed forces, a reliable small arms industry was essential. By early 1920 the new Soviet government had restored some semblance of order at all the weapons factories.[1]

EARLY PISTOL DEVELOPMENT

In the early 1920s, many Red Army soldiers still carried the 1895 Nagant revolver (*revolver sistemy Nagana, obrazets 1895g*). Although the Nagant was generally regarded as a good, reliable weapon, it was difficult to reload—it had a sliding rod-type ejector—and it had a heavy trigger pull when fired double-action. Imperial Guards had some experience with the 1898 Schwarzlose Standart pistols they confiscated from revolutionaries in 1905, and during the revolution many Bolshevik units used Mauser C96 self-loaders with a 99-millimeter barrel. Called *Bolo Mausers* (for Bolshevik), these pistols were quite popular and helped introduce the 7.63 × 25mm Mauser pistol cartridge into Russia. Other self-loaders

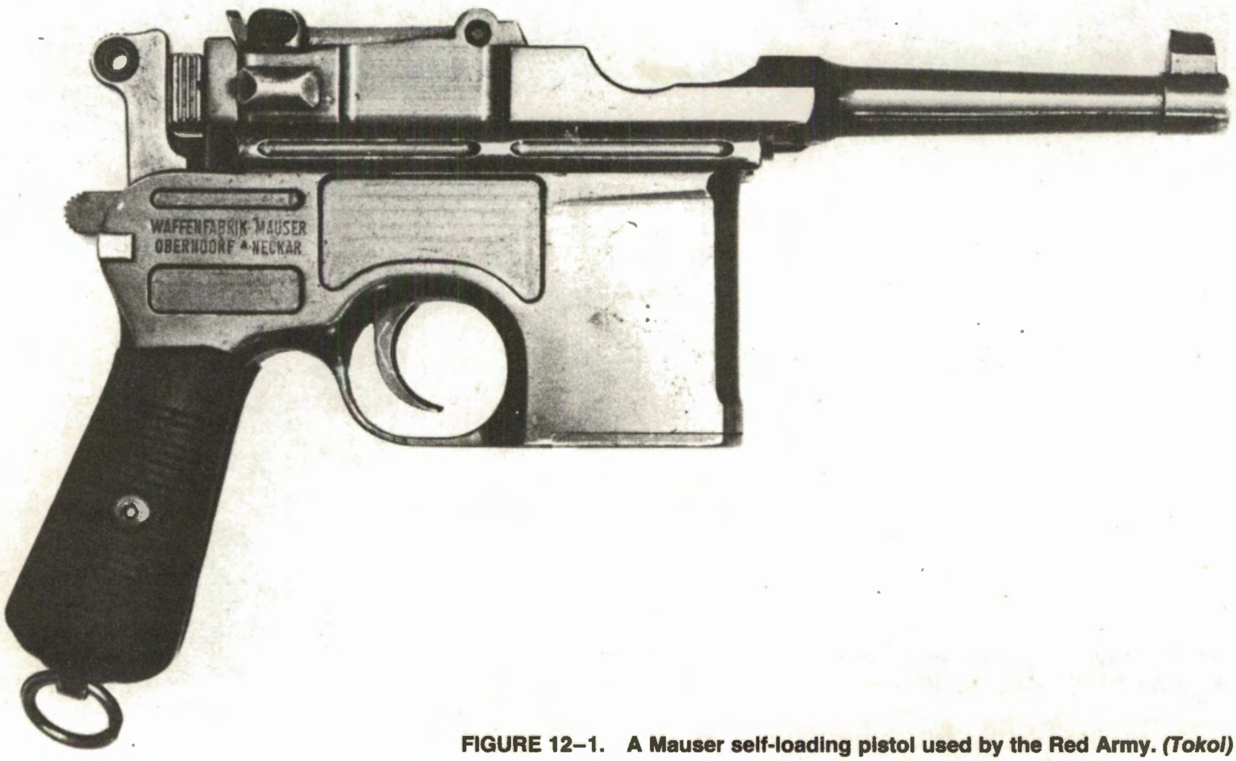


FIGURE 12–1. A Mauser self-loading pistol used by the Red Army. ***(Tokol)***

FIGURE 12–2. A 9mm Model 1903 FN Browning pistol (serial number 27867) used by the Imperial Russian Army. All of these pistols used a shoulder stock holster. *(Sotamuseo)*

FIGURE 12–3. The Russian contract .45 caliber Model 1911 Colt pistol. Taken from the commercial production run at Colt, the serial numbers ranged from about C50,000 to C85,000. There is no evidence, however, that all of these were purchased by or shipped to the Russians. Allegedly purchased by the British War Mission in 1915 and 1916 for the Imperial Russian government, these pistols carried marks in cyrillic meaning "English Order." The pistol illustrated here is serial number C51,876. *(Sotamuseo)*

FIGURE 12–4. The 7.65mm Browning caliber Korovin test model self-loading pistol of 1927 (serial number 13), manufactured at Tula. *(Voenno-istoricheskiy Musei)*

in the hands of Imperial Russian armed forces included the American .45 caliber (11.43mm) Model 1911 and the FN 9mm Model 1903 Browning.

The Korovin and Prilutskiy Pistols

The first Soviet-developed self-loading pistol was one designed in 1920 and 1921 by S. A. Korovin. Chambered for the 7.65mm Browning cartridge, it was submitted to the *Artilleriskiy komiteta* (Artillery Committee) of the *Glavniy artilleriskiy upravelniy* (Main Artillery Administration) for testing in early 1923. On 29 May, the committee noted that the Oranienbaum Weapons Firing Ground staff had reported "that the Korovin system pistol has great advantages" over blowback pistols. Korovin's weapon fired from a locked breech with the locking lug mounted on the lower side of the barrel. The unusual length of the pistol's grip was due to the nine-shot magazine it held, and the Korovin had a striker-type firing mechanism rather than a hammer and firing pin. Its major shortcomings were its weight (915 grams) and the great complexity of its mechanism. Authorities recommended the production of a small lot of pistols to determine its suitability for adoption by the Red Army. The Artillery Committee ordered 50 Korovin pistols from Tula in 1923, where fabrication was slow because of the many design changes the pistol had been subjected to. As a result, it took four years to produce the 50 7.65mm *pistoleti Korovina, opitnyi obrazets 1927g* (Korovin test model pistols of 1927).

While the Korovin test models were being made, S. A. Prilutskiy in 1924 proposed another design; this pistol fired the 7.65mm Browning cartridge. Ten of these guns were ordered from Tula in December 1925, with delivery taking place in 1928. The 7.65mm *pistolet Prilutskogo, opitniy obrazets 1927g* (Prilutskiy test model of 1927) had a locking bolt (not fully described in sources available to the author) and a single-row, nine-shot magazine. The recoil spring was fitted below the barrel.

In the summer of 1928, the Korovin, Prilutskiy, and Walther PP* pistols were tested together by the Soviets. Prilutskiy's gun was by far the least complicated, having 31 parts; the Walther had 51 and the Korovin 56. The Prilutskiy was, therefore, easier to disassemble and reassemble, and it had fewer malfunctions—9 out of 270 shots. The Walther jammed 17 times and the Korovin 9 out of 110 rounds. In accuracy, the Walther produced the best patterns, while the Prilutskiy and Korovin were nearly equal. Although the Prilutskiy pistol came out on top during these trials, the artillery authorities regarded it as not "completely developed" and recommended that the model be bettered. To improve his design Prilutskiy changed the direction the cartridge cases were deflected (they hit the shooter), smoothed the sharp edges on the frame (fingers were cut when stripping the pistol), and conducted metallurgical studies to find a way to eliminate brittleness of the gun's parts. When the alterations were completed, 500 pistols were ordered from Tula by the government.

Before the 1929 models of Prilutskiy's and Korovin's pistols were constructed, the Artillery Committee decided to change the standard pistol caliber to 7.63mm Mauser (7.62 × 25mm in the Soviet Union). The new round would give the user a more powerful handgun and allow for interoperability of ammunition between pistols and submachine guns.*

The Tokarev Pistol

A new designer entered the self-loading pistol experiments in 1929—Fedor Vasilevich Tokarev. One of the most highly respected of the pre-World War II Soviet small arms designers, F. V. Tokarev was born in 1871. By the time he entered primary school at age nine, Tokarev had already demonstrated a keen interest in firearms, stimulated by an itinerant gunsmith from Tula. In 1882 at age eleven, Tokarev became apprenticed to the village blacksmith and two years later began to work with a gunsmith named Krasnov.[2] Because of his technical aptitude, he was accepted as a student at the Novocherkassk Military Trade School in 1888, where he met A. E. Chernolikhov, master weapons technician and designer of the 6-line (.60 caliber) Tula military rifle. After four years of study, Tokarev graduated as a Cossack noncommissioned officer and master craftsman and was appointed Master Armorer of the 12th Don Cossack Regiment, and stationed on the Austrian border.

Four years later, Tokarev returned to the school in Novocherkassk as an instructor in small arms making. After several successful years as a teacher, he was selected to attend one of the elite cadet schools and in due course became a Cossack officer.** By 1907, he was studying at the Officer's Rifle School at Oranienbaum,† which further prepared Tokarev for a career in designing small arms. It was here that he began to work out the design details for a self-loading rifle, which was tested in 1910 and 1914 by the Imperial Army.

The Russian revolution and civil war found Tokarev serving as Assistant Director for Inspection and Manufacture at the weapons factory of Sestroretsk. His popularity with the workers was such that even though he was an Imperial officer they elected him their technical director. In 1919, he became a senior engineer at Izhevsk and two years later was sent to Tula. There Tokarev designed a lightened, air-cooled version of the standard Maxim machine gun.‡ Tokarev's first pistol was, in fact, a machine pistol carbine with a very long barrel (about 250 to 275 millimeters) and a double-row box magazine with a 22-shot capacity. It was a simple blowback pistol with a massive slide and a safety lever on the right side, which was also a fire selector permitting a choice of single shots or continuous bursts. The pistol could be reloaded by either changing the magazine or pulling the slide to the rear and placing a stripper clip in the clip guide machined into the top of the slide. The hammer system was an integral part of the slide, and the recoil spring was mounted on a guide rod, which was attached to the lower frame assembly. Although this 1929 Tula-made prototype was a good shooting weapon, it did not meet the requirements for a self-loading pistol that could be held with one hand. But Tokarev's next design was exactly what the Soviet military was looking for.

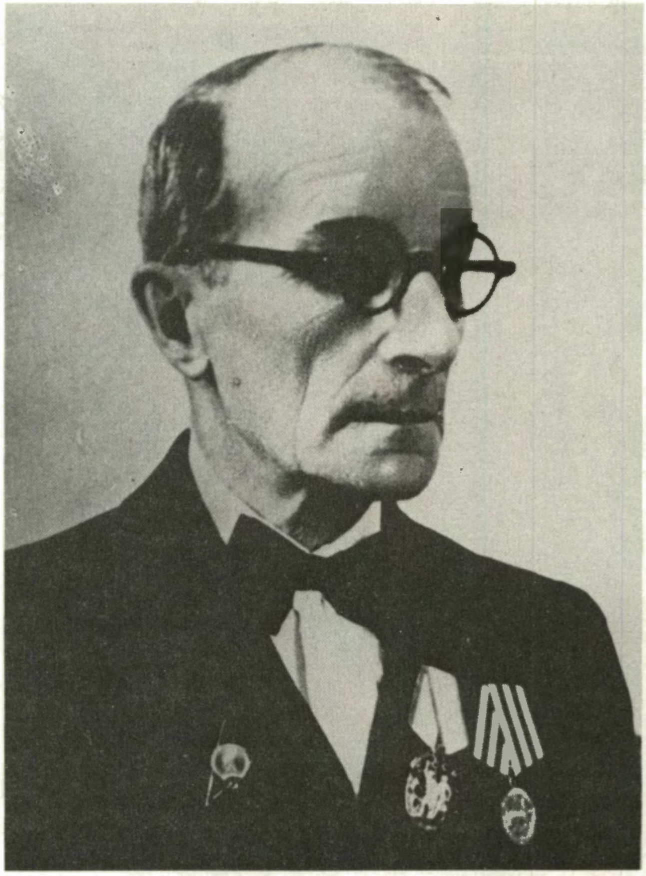


FIGURE 12–5. S. A. Korovin, the Soviet small arms designer. *(Voenno-Istoricheskiy Musei)*

*The Walther PP was first marketed in 1929, so the Russians may have tested a preproduction model during these trials.

**Experiments with submachine guns in the Soviet Union had begun in 1927, and this class of weapons was maturing by 1929.

†Oranienbaum was also the site of the Imperial Artillery Proving Ground (later the Soviet Weapons Firing Ground).

‡Adopted on 26 May 1925 as the Maxim-Tokarev machine gun; three years later an aircraft version developed by Tokarev was also adopted.

FIGURE 12–6. The 7.65mm Browning caliber Prilutskiy test model self-loading pistol of 1928 (serial number 6), manufactured at Tula. At the rear of the frame, the pistol bears the Tula markings. *(Voenno-Istoricheskiy Musei)*

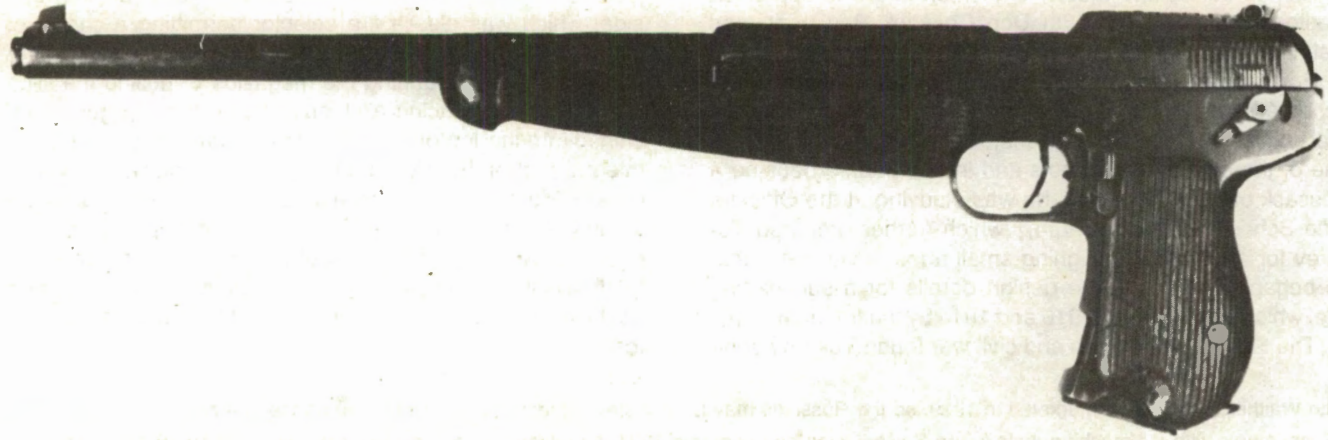


FIGURE 12–7. The selection fire 7.62 × 25mm Tokarev test model pistol of 1929 (serial number 2), fabricated at Tula. *(Voenno-Istoricheskiy Muzei)*

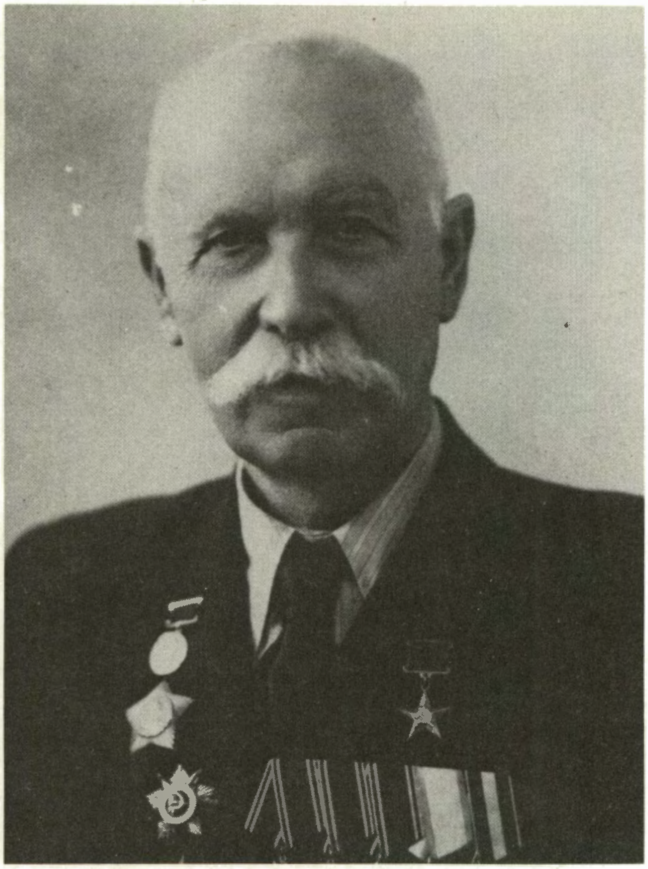


FIGURE 12–8. Fedor Vasilevich Tokarev (1871–1968), master Soviet gun designer. ***(Voenno-Istoricheskiy Muzei)***

Basically an improved Browning locked-breech self-loader, the 1930 Tokarev pistol had several improvements over the standard Colt Model 1911-type Browning. The three important modifications were a removable hammer-lock work assembly, the absence of feed lips on the magazine (the "lips" being machined into the pistol frame), and no mechanical safety of any kind. The *pistolet Tokareva, opitniy obrazets, 1930g* (Tokarev test model of 1930) was considered an excellent design.[4]

During the summer months of 1930, the Weapons Firing Ground staff carried out a comprehensive test of handguns. In addition to the 7.62 × 25mm Korovin, Prilutskiy, and Tokarev models, several foreign pistols were also examined, including a Walther, a Browning, and the Parabellum. The weapons were tested for projectile penetration, ease of reloading, reliability of operation under normal and adverse conditions, and accuracy. Accuracy was checked after the first 1,000 shots of a 2,000-shot endurance test and again at the end of the test. The Tokarev was the winner over the other two domestic candidates and was equal to the best foreign competitors. Even though Tokarev's design was harder to disassemble and reassemble than Prilutskiy's, and Korovin's pistol was more accurate, the Tokarev was much more reliable and durable than either of these because the Korovin and Prilutskiy pistols were heavier and not as well engineered from the shooter's point of view. The test commission recommended that the Tokarev be further improved with special attention to accuracy, sights, safety features, and the trigger pull.

On 23 December 1930, the Soviet Revolutionary War Committee (Revvoyensovyet) called for a demonstration of the Tokarev pistol and several other experimental small arms for senior military officials. Those present included Kliment Yefremovich Voroshilov, People's Commissar of Military and Naval Affairs and chairman of the Revolutionary War Committee; Mikhail Nikolayevich Tukachevskiy (1893–1937), Commander of the Leningrad Military District; and Ieromin Petrovich Uborevich (1896–1937), Deputy People's Commissar of Military and Naval Affairs and Armament Head for the Red Army. As a result of this demonstration, Uborevich ordered 1,000 7.62mm Tokarev pistols manufactured for extensive field trials on 7 January 1931. The Revolutionary War Committee issued the official order on 13 February.

After troop trials with the Tula-made Tokarev, several changes were made to enhance its reliability and durability and to simplify its manufacture. The Tula-Tokarev 1930 (TT-30) pistol had two lugs machined into the upper surface of the barrel to match the locking recesses in the slide. In the improved Tokarev pistol, two circumferential bands were turned on the barrel by lathe, which machined the external surface of the barrel. This modification did not affect the barrel locking system, but it did simplify the fabrication of the barrel. In the TT-30, the back strap of the frame was machined as a separate piece, which provided for easy access to the trigger return spring. The modified Tokarev had a back strap machined as part of the solid forging that made up the frame, and the trigger return spring was modified accordingly. It is conjectured that as many as 93,000 TT-30 pistols were produced before Tula switched over to making the 7.62mm 1930–33 Tokarev in 1936. Table 12–1 summarizes available production figures for Soviet revolvers and self-loading pistols before 1945.

The Russian Nagant revolver was manufactured until 1942, although some specimens have been seen dated 1944. There are several reasons for the long production life of the Nagant revolver. It was relatively easy to manufacture; the factory at Tula was fully equipped to make it; and it could be fired easily through the firing ports of Soviet tanks. In addition, problems with inadvertent magazine release and mainspring fatigue in the Tokarev self-loader diminished the reliability of

TABLE 12-1 SOVIET HANDGUN MANUFACTURE

	1895 Nagant Revolver	*1930 Tokarev Pistol*
1918	**52,863**	
1919	**79,060**	
1920	**43,192**	
1921–1930	**N/A**	**N/A**
1931	**N/A**	**1,000**
1932	**82,368**	
1933	**38,763**	**6,785**
1934		**47,150**
1935	**12,871**	**38,488**
1936	**N/A**	**N/A**
1937	**72,086**	**59,824**
1938	**98,647**	**87,022**
1939–1940	**N/A**	**N/A**
1941	**118,453**	**120,903**
1942	**15,485**	**161,485**
1943–1945	**N/A**	**N/A**

FIGURE 12–9. The 7.62mm Tokarev 1930 pistol (serial number 4820), as made in 1934. *(Sotamuseo)*

FIGURE 12–10. The 7.62mm Tokarev 1930–33 model (serial number 190), made in 1938. *(Hobart)*

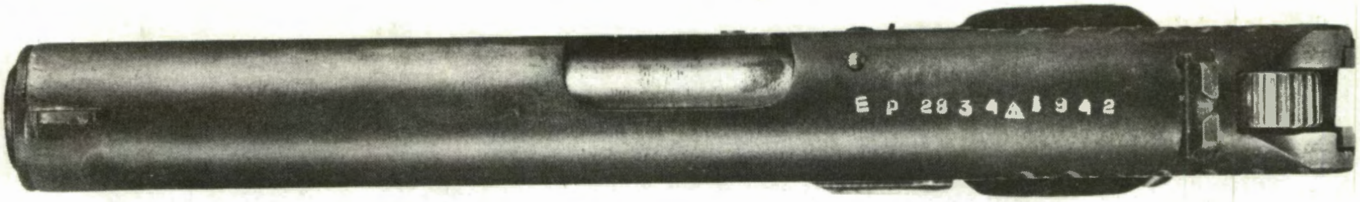


FIGURE 12–11. Typical wartime (1942) quality Tula-Tokarev 30-33 pistol. Note poor exterior finish and wooden grips (serial number 2834). ***(Krcma)***

early production models. As the fronts of the 1939 to 1945 war expanded and the need for reliable handguns grew, the Tokarev self-loading pistol was improved and became the primary handgun of the Soviet armed forces.

SEARCH FOR A NEW SELF-LOADER

On 17 May 1938, the People's Commissar of Defense and the People's Commissar of Defense Industries announced a competition for the design of a new self-loading pistol. Apparently the major design requirement was a fixed barrel that was not surrounded by a moving slide; thereby permitting the pistol to be fixed (like the revolver) through the firing ports of tanks and armored personnel carriers. Pistols submitted by I. I. Rakov, S. A. Korovin, P. V. Voyevodin, and F. V. Tokarev were tested at the Weapons Firing Ground in March

TABLE 12-2 COMPARISON OF SOVIET HANDGUNS

	1895 Nagant Revolver	*1930 Tokarev Pistol*
Caliber (mm)	**7.62 × 38R**	**7.62 × 25mm**
Overall length (mm)	**230**	**195**
Barrel length (mm)	**114**	**114**
Weight (grams)	**748**	**822**
Feed device and capacity	**7-shot cylinder**	**8-shot magazine**
Rifling twist		**4-right**

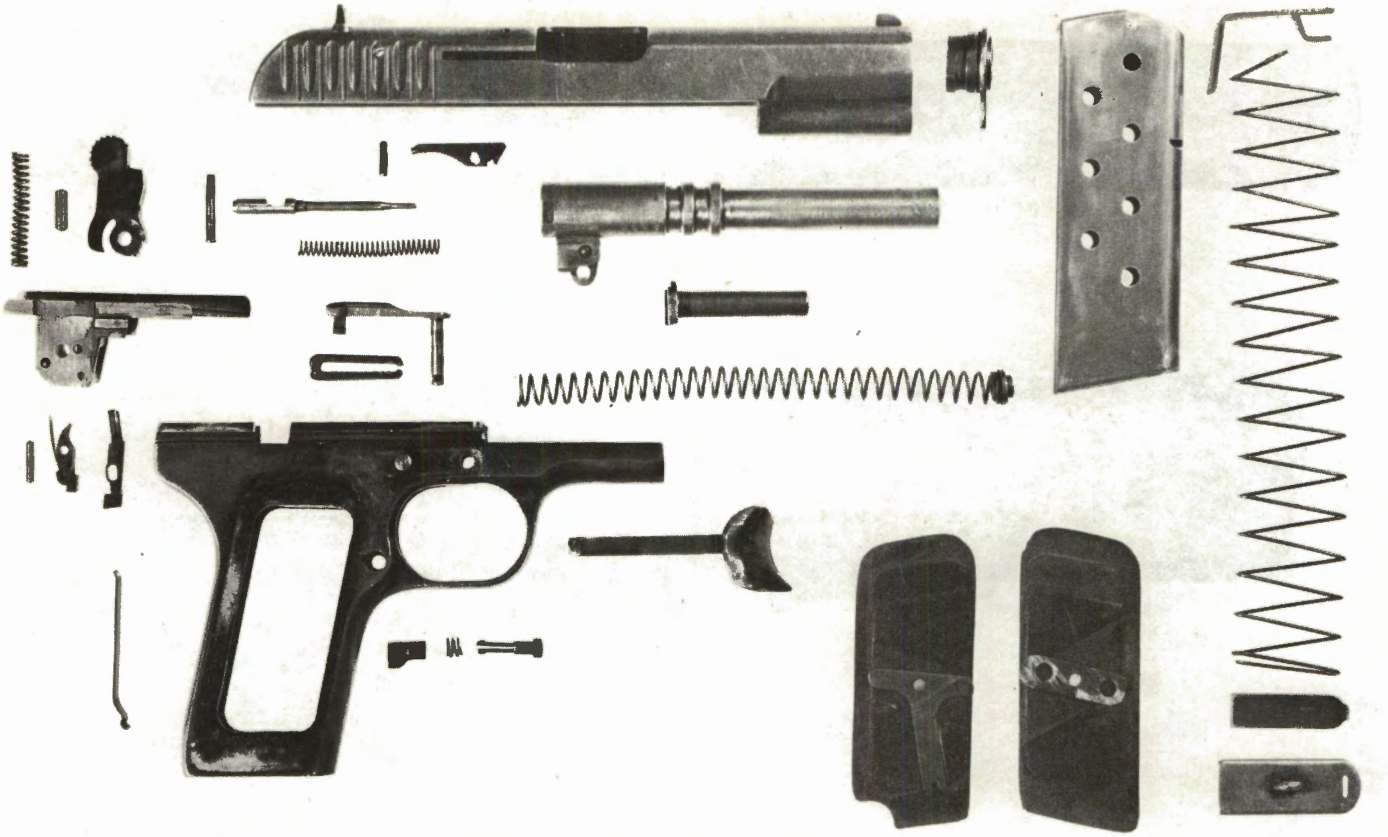


FIGURE 12–12. Disassembled view of a 7.62mm Tula-Tokarev 30-33 pistol. *(U.S. Army)*

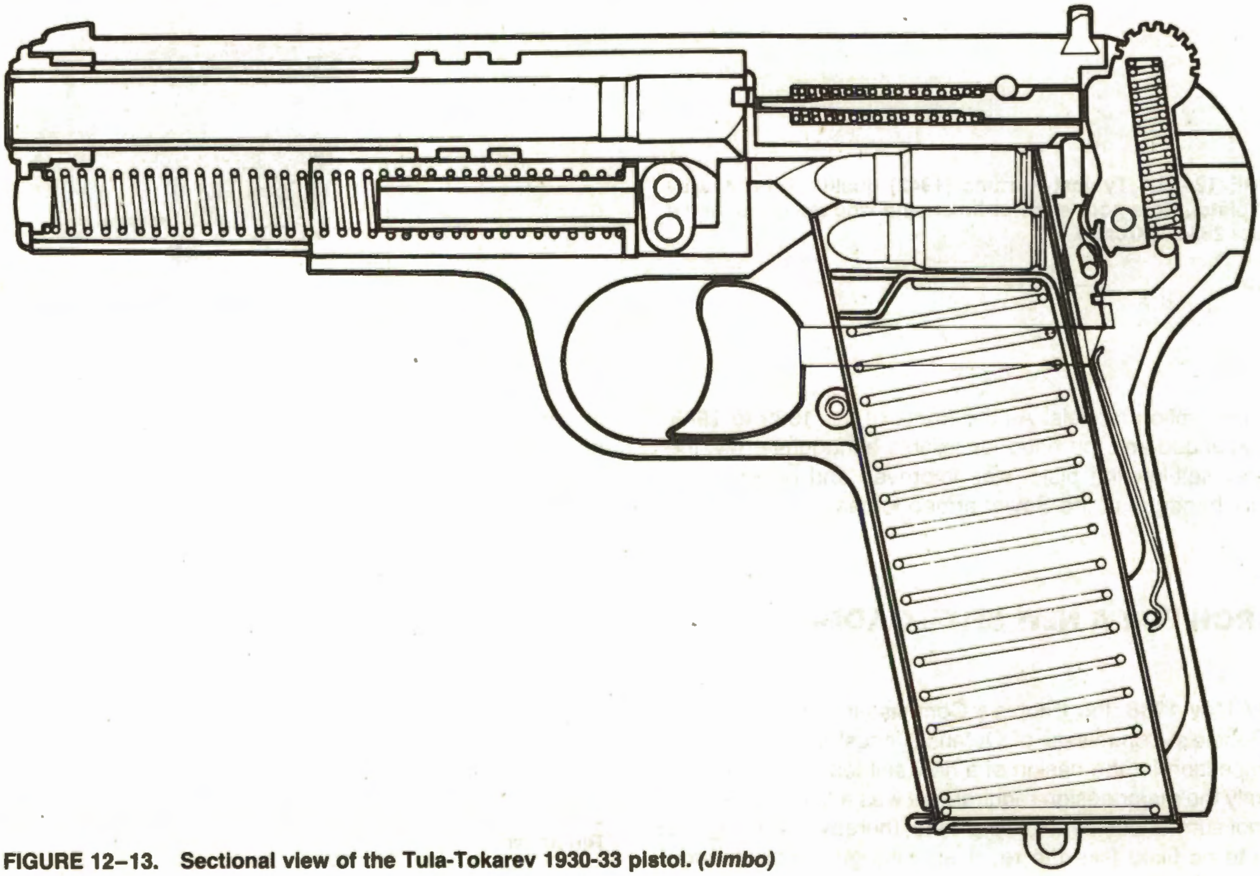
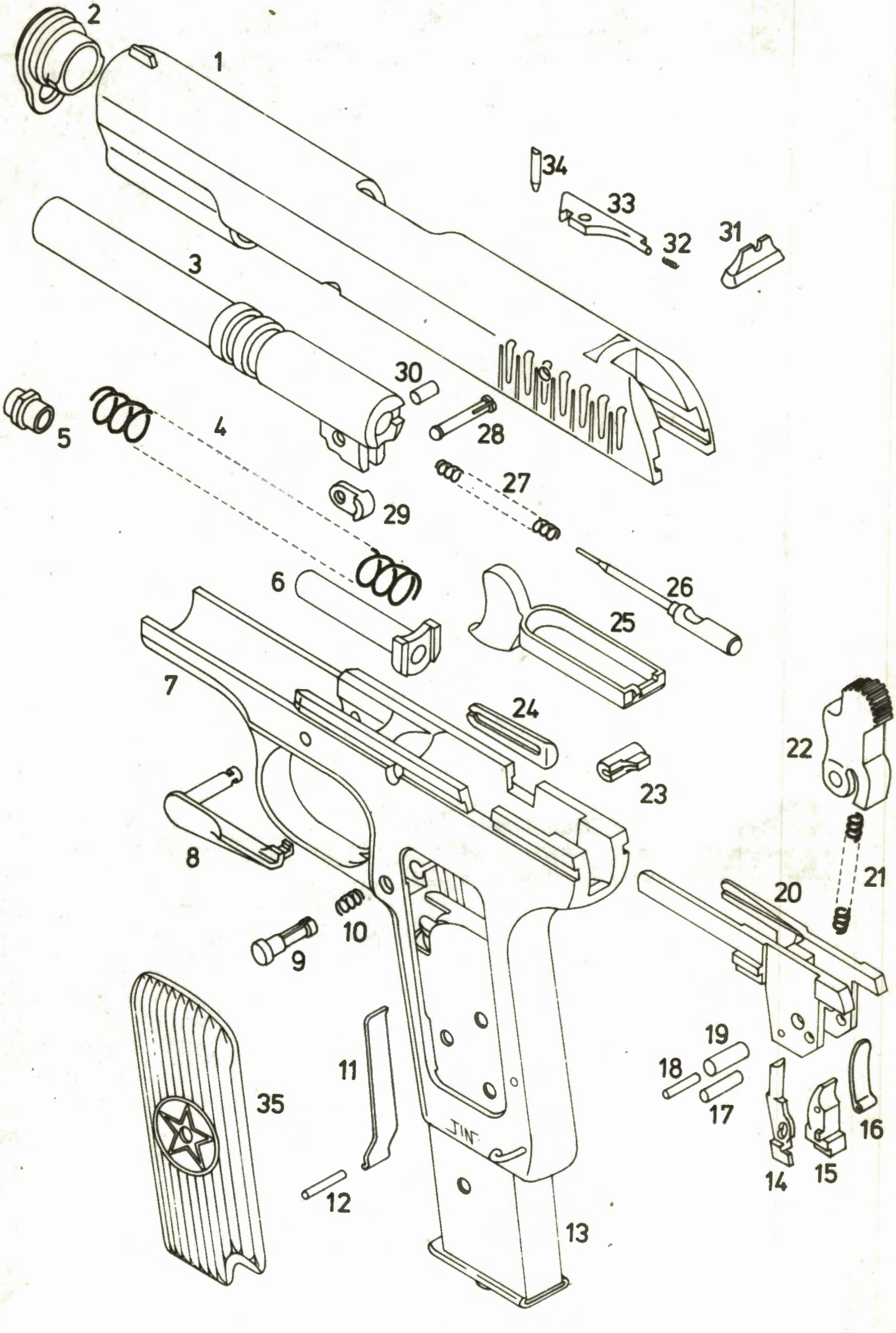


FIGURE 12–13. Sectional view of the Tula-Tokarev 1930-33 pistol. *(Jimbo)*



1. Slide
2. Barrel bushing
3. Barrel
4. Recoil spring
5. Recoil spring retainer
6. Recoil spring guide
7. Frame
8. Slide stop
9. Magazine catch spring guide
10. Magazine catch spring
11. Trigger return spring
12. Return spring pin
13. Magazine
14. Disconnector
15. Sear
16. Sear spring
17. Spring retainer pin
18. Sear pin
19. Hammer pin
20. Hammer assembly housing
21. Hammer spring
22. Hammer
23. Magazine catch
24. Slide-stop retainer clip
25. Trigger
26. Firing pin
27. Firing pin spring
28. Firing pin retainer pin
29. Barrel link
30. Barrel link pin
31. Rear sight
32. Extractor spring
33. Extractor
34. Extractor pin
35. Left-hand grip

FIGURE 12–14. Exploded view of the Tula-Tokarev 30-33 pistol. *(Jimbo)*

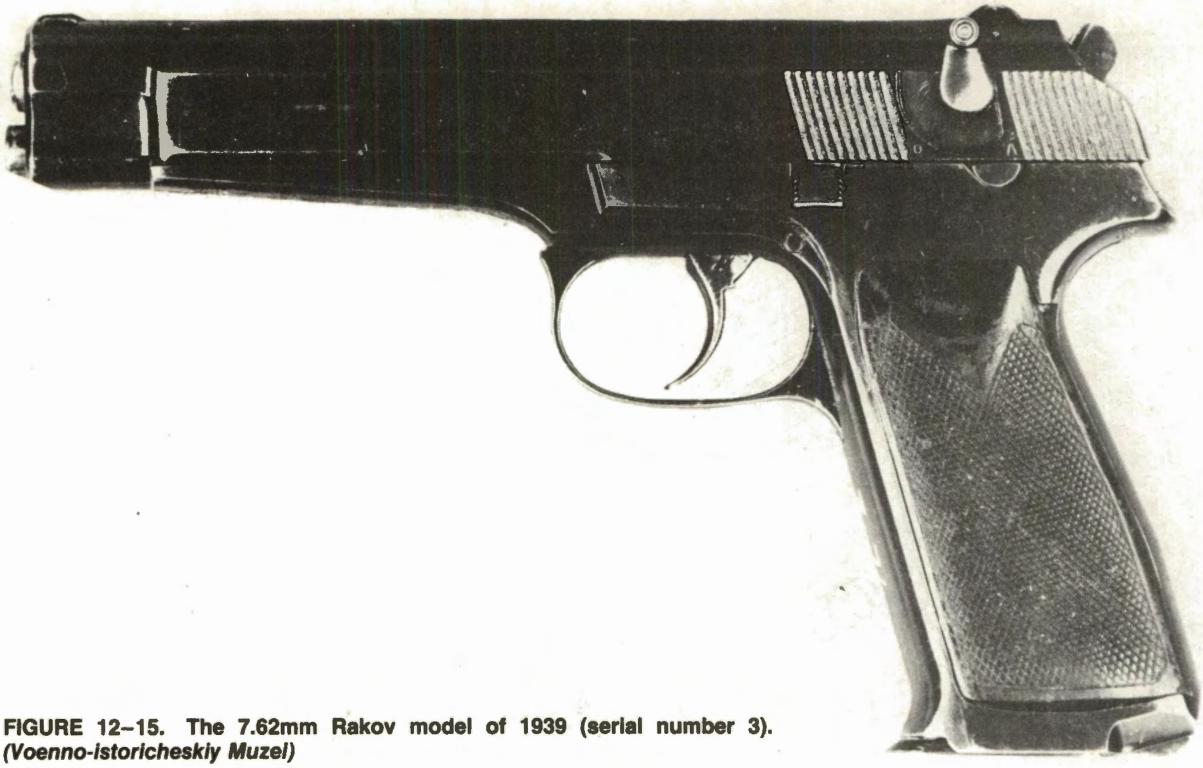
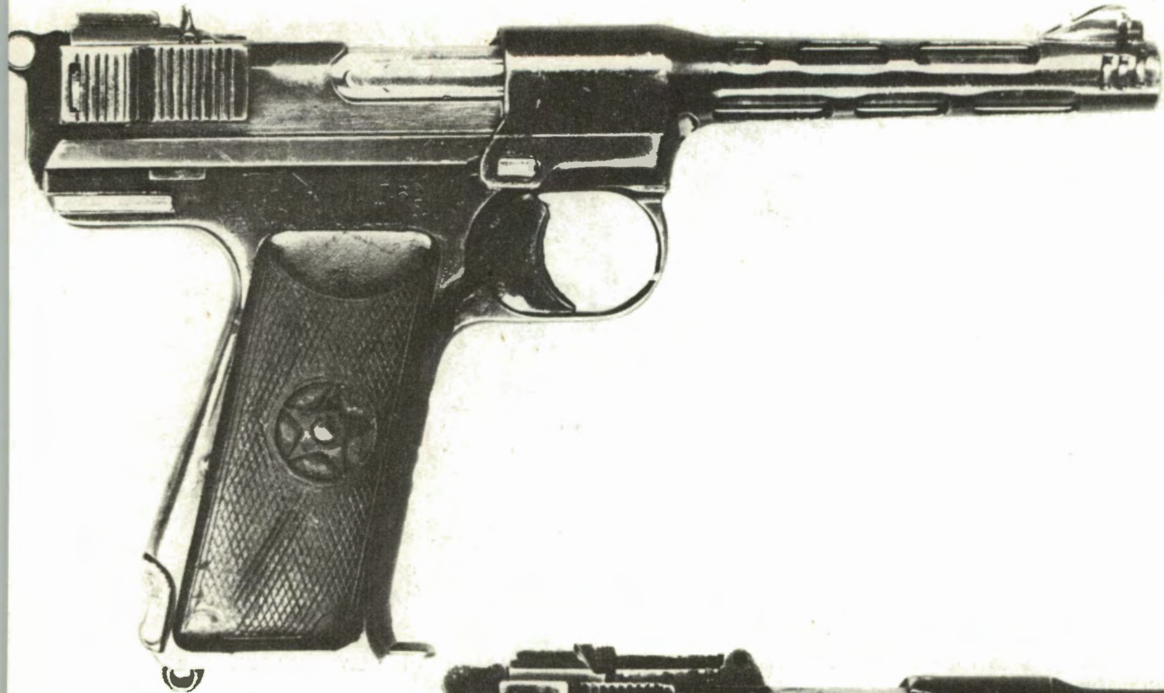
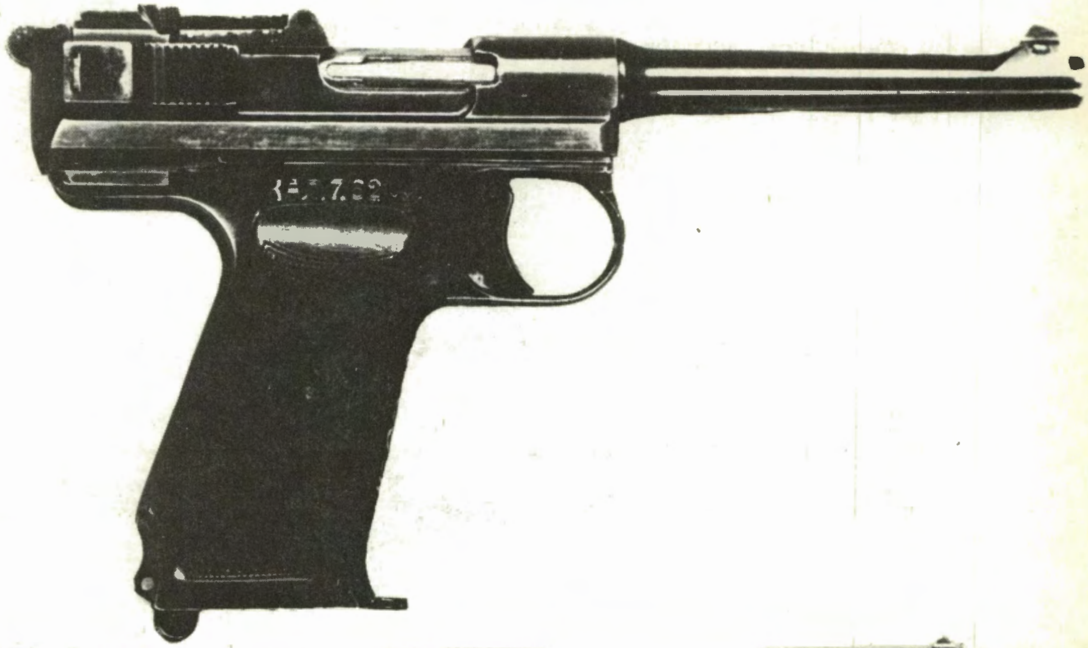


FIGURE 12–15. The 7.62mm Rakov model of 1939 (serial number 3). *(Voenno-istoricheskiy Muzei)*

FIGURE 12–16. The 7.62mm Korovin model of 1939 (serial number 3). *(Voenno-istoricheskiy Muzei)*





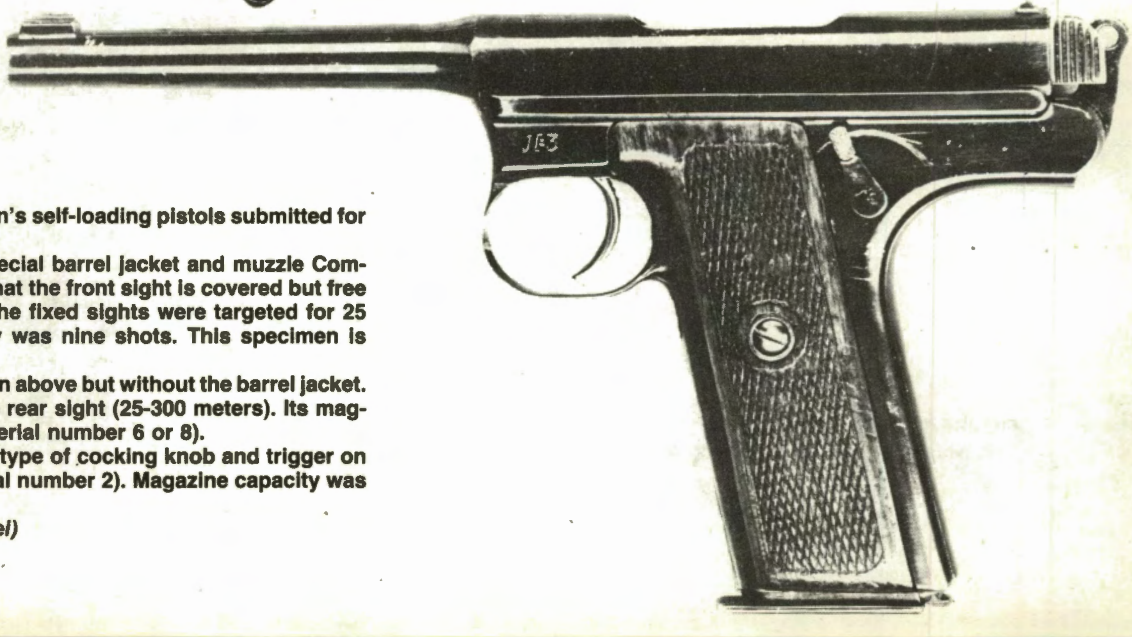


FIGURE 12–17. Voyevodin's self-loading pistols submitted for tests in 1939.
Top: **This design had a special barrel jacket and muzzle Compensator assembly. Note that the front sight is covered but free to recoil with the barrel. The fixed sights were targeted for 25 meters. Magazine capacity was nine shots. This specimen is serial number 6 or 8.**
Middle: **Similar to the design above but without the barrel jacket. It had an added adjustable rear sight (25-300 meters). Its magazine capacity was nine (serial number 6 or 8).**
Bottom: **Note the different type of cocking knob and trigger on this Voyevodin pistol (serial number 2). Magazine capacity was 18.**
(Voenno-istoricheskiy Muzei)

FIGURE 12–18. The 7.62mm Tokarev 1939 test model (serial number 4). ***(Voenno-istoricheskiy Muzei)***

FIGURE 12–19. Postwar (1947) Soviet Tokarev pistol, serial number 152. Note change in the cocking grooves on the slide. ***(Tokoi)***

FIGURE 12–20. The 7.62mm 48 M Hungarian model of the Tokarev pistol. *(Tokol)*

FIGURE 12–21. The Yugoslav M57 version of the Tokarev. *(Tokol)*

FIGURE 12–22. The Hungarian 9mm Parabellum *Tokagypt 58* version of the TT 30-33 pistol serial number E09526. *(Krcma)*

1939. The Rakov had a turning bushing-lock mechanism in the slide, while the Korovin had a swinging lever mounted on the barrel extension. Lugs on the lever locked the bolt mechanism until it had recoiled far enough for the bullet to leave the barrel. A ring connecting the bolt lever and the frame accomplished the actual unlocking. The Voyevodin had a locking mechanism that involved a bushing in the frame with a locking lug connected to the bolt. A description of the locking system for Tokarev's 1939 self-loader has not been found.

In these tests, held in March and May 1939, the Rakov pistol was ranked first, the Korovin second. People's Commissar of Defense K. Ye. Voroshilov, who personally fired the prototype pistols, gave orders that the Rakov and Korovin pistols be developed further. The Rakov had jamming problems, and the Korovin was not accurate enough for a military weapon. Further testing was done in July of that year, with the Voyevodin nine-shot pistol being added to the list.

P. V. Voyevodin also submitted a second self-loader for testing in 1939. It had an 18-shot magazine and was a blowback design with a retarding mechanism. The spring-loaded retarding block slowed the recoil of the bolt. Tested at the Weapons Firing Ground on 22 to 25 June 1940, the Voyevodin did not perform as well as predicted, with 6.5 jams per 100 shots. Nevertheless, Commissar Voroshilov, now deputy chairman of the USSR Council of People's Commissars, advised the new People's Commissar of Defense, Semen Konstantinovich Timoshenko, to procure 50 of the new 18-shot pistols for further trials.

The Voyevodin, the eight-shot Rakov, and the nine-shot Korovin were tested again in March 1941, and at its 6 April 1941 meeting the Main Artillery Administration concluded that the Voyevodin pistol most fully satisfied the technical and tactical requirements for a new handgun. Of most significance was its rapidity of fire and its accuracy. It was also the most reliable and durable of the pistols tested, even though it was heavier and longer than the Tokarev. It compared favorably with the Parabellum, Webley & Scott, and Astra self-loaders, which were tested by the Soviets at the same time.

The German invasion of Russia in June 1941 precluded the adoption of the Voyevodin pistol, however, and Tokarev's pistol remained the standard self-loader of the Soviet forces until the 9 × 18mm Makarov pistol was adopted in 1951. Production of the Tokarev continued until about 1954. In addition, after World War II, the Tokarev pistol was manufactured in the People's Republic of China as the *Type 51*, *Type 54*, and *M20* (the latter being an export model); in Poland (*Pistolet TT*) for the Polish, Czech, and East German armed forces; in Hungary as the *48 M;* and in Yugoslavia as the

FIGURE 12–23. The 6.35mm Tula Korovin pocket pistol. *(Krcma, U.S. Army)*

TABLE 12-3 RAPID-FIRE CAPABILITY AND ACCURACY (AT 25 METERS FROM A STANDING POSITION)

System	*Rapidity of fire (shots per minute)*	*Number of hits*	*Percentage of hits*
Voyevodin pistol	**41**	**36.0**	**87.8**
Korovin pistol	**32**	**25.5**	**79.7**
Rakov pistol	**30**	**22.5**	**75.0**
Tokarev pistol (TT 30-33)	**34**	**26.0**	**76.5**

M51. The North Korean *Type 68* pistol was also derived from the Tokarev. The Hungarians also produced a 9mm Parabellum version of the TT30–33 for the Egyptians in 1958. Yugoslavia made a 9mm Parabellum model for export called the *M65*. There was also a .22 rim-fire (5.6mm) caliber training version (*TT-R-3*) and a 7.62mm long-barrel target version (*TT-R-4*) with adjustable sights. The Tokarev had a long service record with the Soviets and can still be found in use around the world.

A small Russian pocket-sized pistol also deserves attention. Between 1926 and 1935, Tula manufactured a 6.35mm Browning caliber Korovin pistol that was adopted in 1926. This blowback pistol, generally called the *TK* for *Tul'skiy Korovina* (Korovin of Tula) or *TOZ* for *Tul'skiy Oruzheiny Zavod* (Tula Weapons Factory), was apparently used by police and military officers. It had a fixed barrel, open-top slide, and striker-type firing mechanism. Removal of the barrel was accomplished by withdrawing the safety catch, the pin of which anchored the barrel in place. The small Korovin was produced in substantial quantities: serial numbers 200,000 to 387,000 have been reported for the 1926 to 1930 period and from A54,000 to A199,000 for 1930 to 1935.

NOTES

1. Unless otherwise noted, this chapter is based upon D. N. Bolotin, *Sovyetskoe strelkovoe oruzhie za 50 let* (Leningrad: Izdaniye Voenno-Istoritskogo Muzeya Artillerii, Inzhenernikh Voisk i Voisk Svyazi, 1967), pp. 9–23, 158–75, 425–52.

2. Bolotin, "Vuidayushchysya sovyetsky oruzheinik (k 100-letiyu so dnya rozheniya F. V. Tokareva)," *Voenny Ventnik* (no. 6, 1971): 108–10.

3. Bolotin, *Sovyetskoe strelkovoe orushie za 50 let*, pp. 108–109.

4. F. V. Tokarev, "Soviet Small Arms," *Starshina Serzhant* (no. 1, 1968): 3 (in translation).

13 SPANISH HANDGUNS BEFORE 1938

The handgun industry of Spain has always been concentrated in the Basque provinces of Guipúzcoa and Vizcaya. For centuries, the fiercely independent Basques have lived in these two areas and in Alva and Navarre along the Franco-Spanish border. Ironworking was a traditional skill, and by the early years of the twentieth century the cities of Eibar and Elgolibar in Guipúzcoa and Guernica in Vizcaya had become major small arms manufacturing centers. While the central government in Madrid established arsenals to manufacture the rifles needed by the Spanish military, the need for pistols was so small that they could be procured from the private arms makers of the Basque region. However, as production of handguns increased (in large part because of a flourishing export trade) and as Spanish politics boiled over into a war in the late 1930s, the handgun-making industry came under more rigorous control, and only three major firms survived—Astra, Unceta y Compañia; Star, Bonifacio Echeverria SA; and Llama-Gabilondo y Cia SA. In this book, only the general outline of self-loading pistol manufacture in Spain will be discussed. Hopefully from this start, the reader will gain an appreciation for the nature of the private handgun industry in Spain as it existed on the eve of World War II.

BERGMANN-BAYARD, MODELO 1903 AND 1908

The Spanish army, as noted in chapter 2, considered handguns secondary weapons. Procuring enough rifles with which to equip its forces had been the army's major concern in the final years of the nineteenth century. But after the turn of the century, the army's Comisíon de Experiencias de Artilleria (Ordnance Testing Commission), as the result of a series of trials, recommended the adoption of Theodor Bergmann's Mars Pistol (No. 6). A royal decree on 5 September 1905 established that handgun as the *Pistola Bergmann de 9 m/m Modelo 1903.* Adoption of the Bergmann made Spain the third country, following Belgium and Switzerland, to adopt a self-loading pistol as an official side arm. The Spanish army's pistols were to have been manufactured by Bergmann in Germany, but he wanted large orders before beginning production, and Spain required only a few thousand.

After field experience with Modelo 1903 prototypes, the commission decided to make some modifications to the gun's safety mechanism, and by another decree in November 1909 a newer model was established—the *Pistola Bergmann de 9mm Modelo 1908.* By this time, Bergmann had concluded that it would not be economical for him to manufacture the handguns himself and began to seek another firm to produce the improved Modelo 1908. An agreement was worked out with the Societe Anonyme Anciens Établissments Pieper (AEP) of Herstal, Belgium, a firm that was looking for production work to make up for that which had been lost to the Fabrique Nationale. AEP incorporated all of the design changes recommended by the Spanish—an interrupter, a modified safety catch, and a larger magazine catch. By 1909, AEP was beginning to deliver the first of 3,000 pistols to Spanish army depots. They were numbered serially from 1001 to about 5000, which indicates that the Belgian company sold this model to customers other than the Spanish army. Pistol number 1001 was presented to the Museo de Artilleria during that first year of production. Two years later, rubber pistol grips were authorized as substitutes for the original wooden grips, the work being done at the Real Fábrica de Armas Portátiles de Oviedo.

The Modelo 1903 and 1908 were chambered to fire the 9mm Bergmann-Bayard cartridge (9 × 23mm), generally called the 9mm Largo in Spain. Loaded with .47 gram of nitrocellulose, smokeless powder (*pólvora de nitrocellulosa en laminillas filiación número 41*), it could propel a 9-gram bullet about 355 meters per second. Cartridges were manufactured at several government arsenals, including the Pyrotechnia Militar de Sevilla and the Fabrica Nacional Palencia.[1]

CAMPO-GIRO, MODELO 1913 AND 1913–16

While the army was concentrating its attentions on the Bergmann, Don Venancio López de Ceballos y Aguirre, Conde del Campo-Giro, was working on a self-loading design of his own. The Count of Campo-Giro, a retired artillery lieutenant-colonel who had been assigned to the General Staff and had served on the commission that recommended the Bergmann-Bayard, began his work in about 1900. The first firing prototypes of his pistol were built at the government arsenal Fabrica de Armas Portátiles de Oviedo in 1903 and 1904 and were tested in 1904, despite their experimental nature. Several different versions of the so-called Model of 1904 exist, but the differences are minor external ones. The Count registered his invention with Spanish patent officials on 7 October 1904 (patent 34,796) and again in 1910 (patent 49,270) for a modification to his design.

At the request of the Comisíon des Armas Portátiles (Small Arms Commission), 25 of the *Type 1910* Campo-Giro pistols were made at the Fabrica de Armas Portatiles de Oviedo. The Type 1910, with wooden grips instead of molded rubber ones, was a locked-breech pistol, the lock being a

FIGURE 13–1. As Astra company drawing of the 9mm Largo *Pist. aut.ª mod. 1913,* serial number 1,009. The arrow indicated the location of the magazine release. *(Astra)*

FIGURE 13–2. The 9mm Campo-Giro Pist. aut.ª mod.ª 1913-16, serial number 11,349. The arrow indicated the position of the magazine release. *(Krcma)*

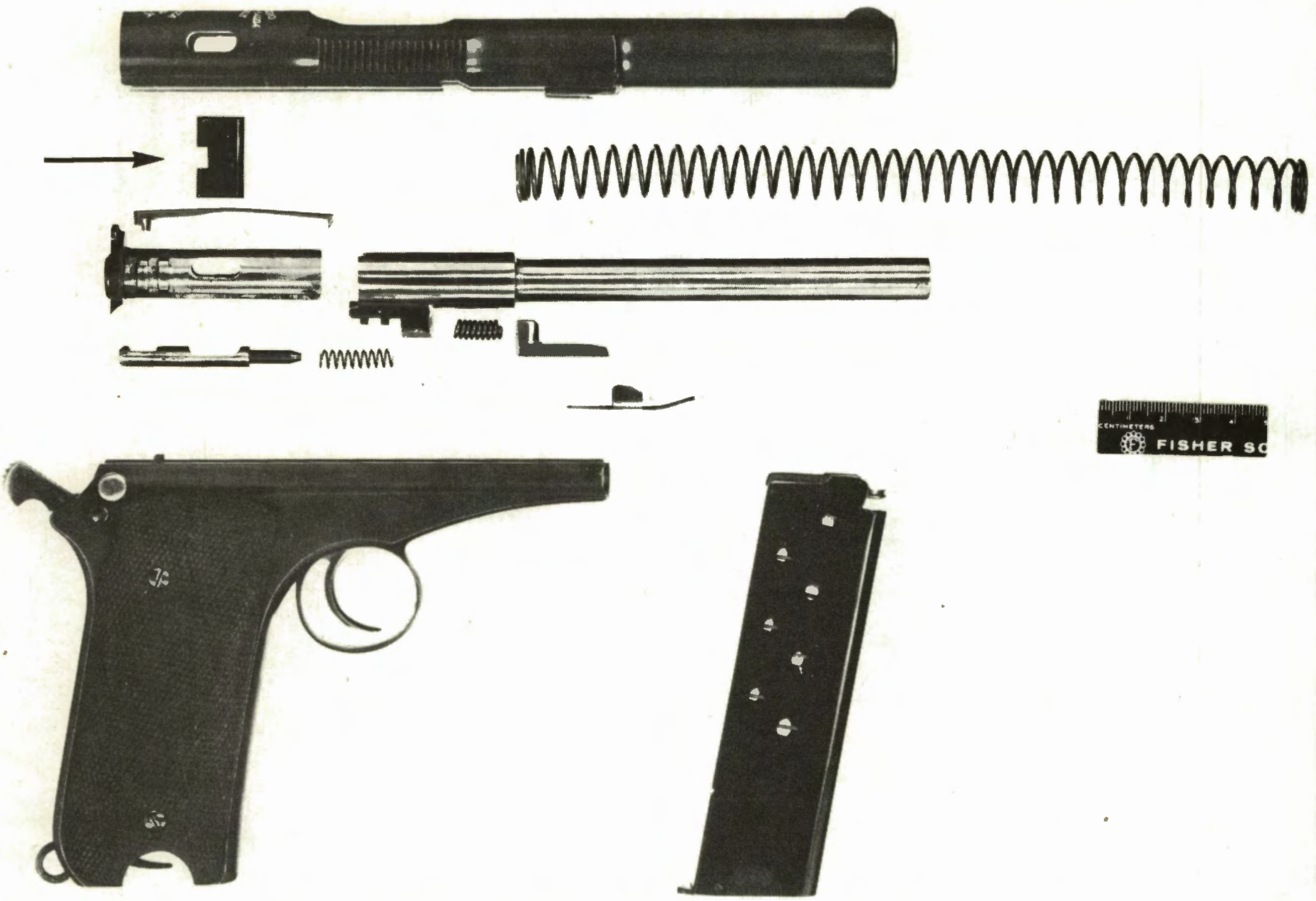


FIGURE 13–3. A disassembled view of the 1913-16 Campo-Giro pistol. Note the cross-key *(arrow)*, which holds the breech piece to the receiver slide. The cross-key also retains the firing pin inside the breech piece. *(Krcma)*

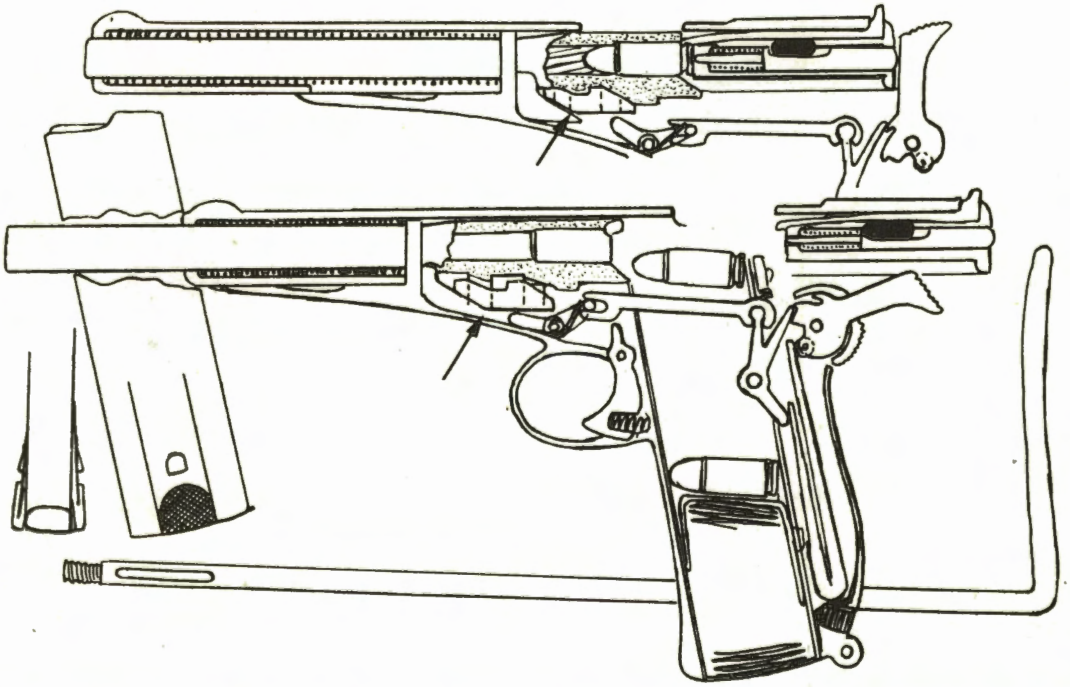


FIGURE 13–4. The 1910 version of the Campo-Giro self-loading pistol. Arrows indicate the sliding locking wedge. The L-shaped piece in the drawing is a stock for the pistol, which could be screwed into the socket at the base of the pistol grip. *(Marsh)*

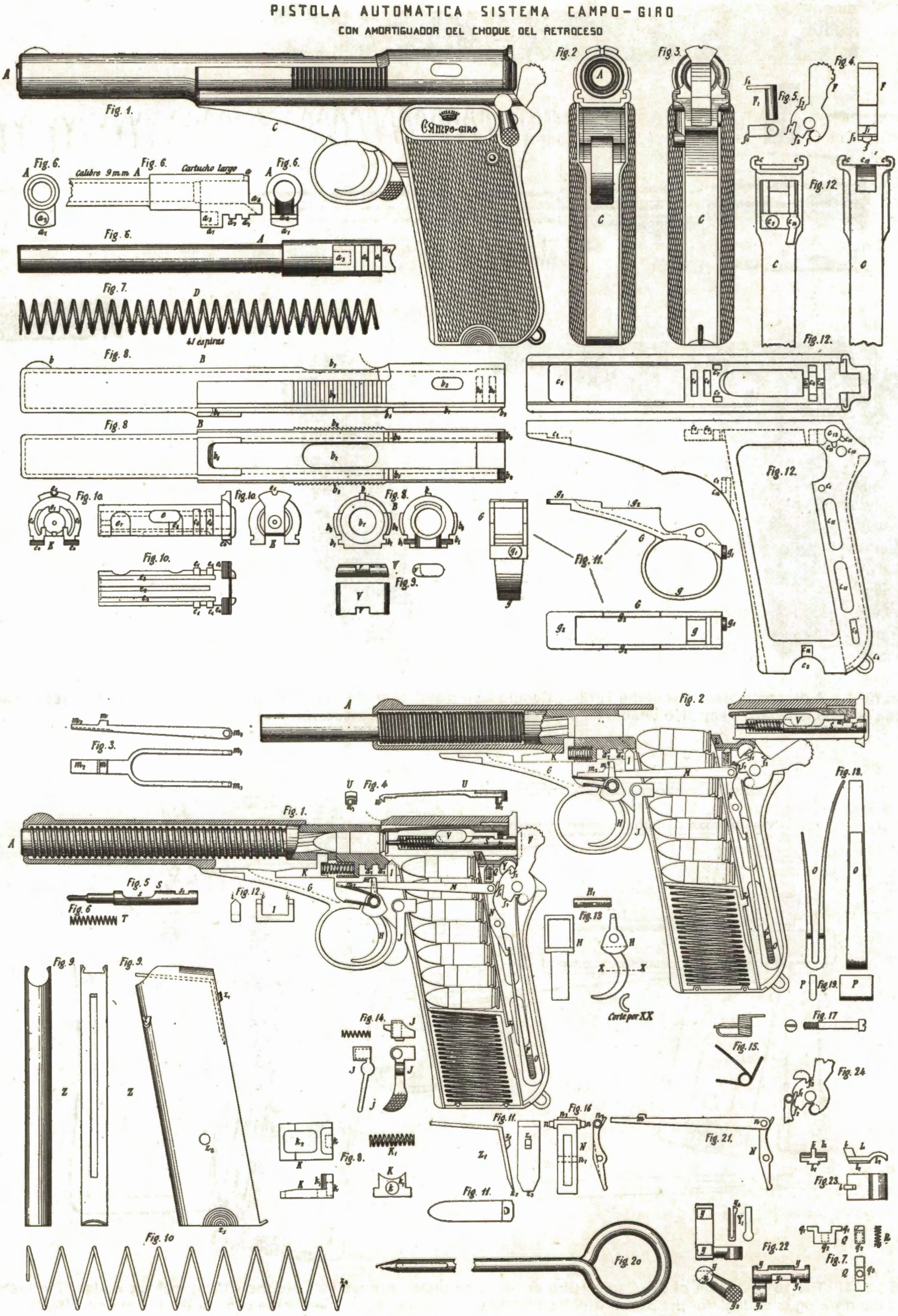


FIGURE 13–5. Unceta y Esperanza drawings of the Model 1913 Campo-Giro pistol. *(Unceta y Esperanza)*

laterally-sliding wedge beneath the rear of the barrel, which was controlled by a track cut into the frame. It made a favorable impression with military officers because of its rapid rate of fire and its powerful 9mm Largo cartridge. Technically the Count's pistol is interesting because of its construction. The breech piece was locked to the slide by a cross-key, and removal of the key after the breech piece had been drawn to the rear permitted the slide to be moved forward and disassembled from the frame. This remarkably simple but uncommon assembly concept was to appear later in the Japanese Type 94 (1934) self-loader, along with the locking wedge, which also acted as a trigger disconnector. After the small arms commission tested the gun, a simplified version was adopted on 24 September 1912 as the *Pistola Compo-Giro, de 9mm, mod. 1913,* commonly shortened to *Pist^a^. aut^a^. mod. 1913.* Esperanza y Unceta, a Spanish arms manufacturer, undertook the production of 1,000 1913 pistols, calling them *Pistolas Automática Sistema "Campo-Giro" con amortiguador del choque del retroceso*—literally translated, this name suggested some type of muffler or deadener (*amortiguador*), but actually the new gun was little more than a high-powered blowback self-loader. The locking wedge of the Modelo 1910 was replaced in the modified 1913 by an extremely strong recoil spring. As in the early model, the spring was fitted around the outside of the barrel.

In January 1914, another model of the Count's pistol was adopted by military authorities in Madrid. Covered by Spanish and British patents (60,666 of 1914 and 23,651 of 1913, respectively), this new pistol had a modified safety lever and magazine release. The release had been moved from near the trigger guard to the base of the pistol grip, and the grip plates were held with two screws instead of one. The original safety could be applied only when the hammer was in the half-cock position. As modified, it could be used with the hammer in any position. When the hammer was down, the safety rotated the hammer away from the firing pin to provide added safety. As before, the 9mm Largo caliber was used. This version was called the *Pistola Campo-Giro, de 9mm, mod. 1913–16.*

Production of the Modelo 1913 and 1913–16 was brief and the subject of some confusion. Manufacture of the 1913 was limited to about 995 units, with 960 being delivered to the army. Of the 13,617 Modelo 1913–16s made between 1914 and 1919, 13,178 were sold to the government. There may also have been a separate series manufactured for commercial sale. The price to the army was 61 pesetas, about $11.77.[2]

At first, the Campo-Giro self-loader was the subject of much praise. According to the small arms commission: "The Count of Campo Giro has done the Nation and the Army a great service with his intelligence, perseverance, and ability, not only with the creation of a new pistol now declared official, but with the continuation of his labors and creation of a new type of weapon, even better perfected than the former."[3] But by 1921, the Campo-Giro had been replaced by the *Pistola de 9mm Modelo 1921* (Astra Modelo 400). No satisfactory explanation has been given for this change, but an Astra company history reported that a problem with the Campo-Giro was discovered soon after its adoption and manufacture. The Count was killed in 1915 or 1919 in a riding accident, and there was no one available who could deal with the pistol's problems. It is possible that the 9mm Largo cartridge was too powerful for the pistol's blowback mechanism, resulting in excessive parts breakage.

TABLE 13-1 · ESPERANZA Y UNCETA MODELO 1913-16 PRODUCTION

Year	*Serial Range*	*Annual Total*
1916	**961 to 3,379**	**2,419**
1917	**3,380 to 4,379**	**1,000**
1918	**4,380 to 8,638**	**4,259**
1919	**8,369 to 14,138**	**5,500**

Before his death, the Count of Campo-Giro was experimenting with versions of his basic design in several different calibers. Apparently the Count had planned to build a .45 caliber (11.25mm) model because in 1906 he obtained 500 rounds of American experimental automatic pistol ammunition from the U.S. Ordnance Department.[4] While it is not known if he actually oversaw the construction of .45 caliber prototypes, he did have at least one 7.65mm Browning caliber blowback model built around 1912 to 1915. Unfortunately, the majority of the Astra factory records were destroyed during its occupation by Republican troops in the spring of 1937. In the late 1970s, the Guardia Civil returned a 7.65mm prototype to Astra, which had apparently been submitted to but never adopted by this national police organization.[5]

PISTOLA DE 9mm MODELO 1921

By arrangements between the Count of Campo-Giro and Don Juan Esperanza, upon the death of the Count, his pistol patents became the property of Esperanza y Unceta. Don Juan saw possibilities for improving the Campo-Giro, which would lead to easier field stripping, reduction in production costs, and improved functional reliability. By mid-1920, Esperanza y Unceta had fabricated a new pistol based on the Campo-Giro with a concealed hammer and takedown procedures similar in concept to the Fabrique Nationale Browning Model 1910.

Esperanza y Unceta submitted their new handgun, the Astra 400, to the artillery commission in late 1920. It was received enthusiastically by test officials on 9 February 1921, and in September it was adopted as the *Pistola Astra modelo 1921.* This designation was short-lived, however, and was changed the next month to *Pistola de 9 milimetros modelo 1921.* Under the trade name Astra, Esperanza y Unceta (Unceta y Cia after 1926) manufactured 106,175 Astra 400s between 1921 and 1945. Through July 1936, Modelo 1921s were sold to the Spanish army (38,901), the carbineros (10,085), security forces (227), the Spanish marines (1,650), and the Chilean navy (842), and as special models and exports (4,116).

From 18 July 1936 to 27 April 1937 during the Spanish civil war, Unceta y Cia was operated by the Basque faction of the forces opposing Generalissimo Francisco Franco and his Nationalists. The Basque Republic (Gobierno de Euzkadi, proclaimed on 7 October 1936) acquired 14,750 Modelo 1921 pistols. From 1937 to 1939, the Nationalist Army procured

FIGURE 13–6. Proposed Campo-Giro blowback pistols. *Top to bottom:* Campo-Giro .45 (11.25mm); Campo-Giro .380 (9mm Corto); Campo-Giro .32 (7.65mm) with 165-millimeter barrel; and Campo-Giro .32 (7.65mm) with 115-millimeter barrel. Judging from the drawing, the .45 caliber model would have been 236 millimeters overall, compared to the 216-millimeter Model 1911. *(Astra)*

TABLE 13-2 CAMPO-GIRO PISTOLS

	Type 1904	*Type 1910*	*Model 1913*	*Model 1913-16*	*Prototype 7.65mm*
Caliber (mm)	**9mm Largo**	**9mm Largo**	**9mm Largo**	**9mm Largo**	**7.65 Browning**
Overall length (mm)	**270**	**243**	**235**	**237**	**173**
Barrel length (mm)	**190**	**165**	**165**	**165**	**115.5**
Weight (grams)	**N/A**	**925**	**900**	**950**	**560**
Rifling/twist	**N/A**	**6-right**	**6-right**	**6-right**	**N/A**
Method of operation	**locked**	**locked**	**blowback**	**blowback**	**blowback**
Method of loading	**sliding wedge**	**sliding wedge**	**none**	**none**	**none**
Feed device/ capacity	**box magazine/8**	**box magazine/8**	**box magazine/8**	**box magazine/8**	**box magazine/8**

FIGURE 13–7. An Astra drawing of the 7.65mm Campo-Giro experimental pistol (no serial number). ***(Astra)***

20,325 pistols. Deliveries of Modelo 1921s between 1940 and 1946 included 6,800 to the Spanish army, about 6,000 to the German Wehrmacht, and about 1,600 to the export market. During the civil war, Republic forces manufactured copies of the 1921 in a workshop in Valencia; they were marked *RE* for *Republica Española.* Other copies produced at Tarrasa in Catalonia were marked *F. Ascaso,* after a famous anarchist leader. No accurate production figures for the Republican-made pistols are available.[6]

Many other variations are found in the markings of the Modelo 1921. This is due in part to a change in the company's name. Several branches of the Spanish military issued the arm and each also used its own markings on the top front of the tubular slide ahead of the Astra starburst trademark; for example, a crown for the Guardia Civil or an anchor for the navy. Early production guns have *EU* superimposed on the starburst, while later ones have *UC.* The top rear of the slide behind the ejection port is marked either *ESPERANZA Y UNCETA* or *UNCETA Y COMPANIA/GUERNICA ESPANA/ PISTOLA de 9m/m/MODELO 1921.* The type faces also varied so that markings may appear to differ even though the wording is the same. The Modelo 1921 was originally issued with monogrammed hard rubber grips bearing the Astra trademark. The standard magazine catch was centered at the bottom rear of the grip frame, but some examples with navy markings have been found with a side-mounted push-up lever like that of the 1913–16 Campo-Giro. This variant catch was also used on the Astra Models 300 and 600.

ASTRA, THE MANUFACTURER

On 17 July 1908, Don Juan Pedro de Unceta-Baerenechea Cendoya (Don Pedro Unceta) and Don Juan Esperanza joined forces to manufacture handguns. Esperanza was born in Aragon and came to the Basque region, where he settled in the gun making community of Eibar. A skilled mechanic, by the early years of the twentieth century he was engaged in the manufacture of many mechanical products. Don Pedro Unceta, descended from a long line of Eibar firearms makers, had served his apprenticeship in the workshop of an uncle. In July 1908, Esperanza and Unceta agreed that their firm would be devoted "to mechanical fabrication of different articles or manufacturers of iron and steel." Esperanza apparently ran the workshop, while Unceta took care of its overall management. Esperanza left the partnership in 1926.

The first products of Esperanza y Unceta, excluding work done under contract for other arms makers, was the *Victoria* series of self-loaders. These 6.35mm and 7.65mm Browning caliber pistols were based on the Model 1903 Browning design. Slides were marked 6.35 or 7.65 "1911 Model Automatic Pistol Victoria Patent" until 1914 when the name was changed to Astra. A specimen with serial number 1 at the Astra factory has an external hammer, a pattern that was short-lived. A grip safety was added in 1916. Production of the Victorias began in Eibar, but after manufacturing nearly 50,000 handguns, the company moved its factory to Guernica. Production continued through serial number 300,000. A nine-shot 7.65mm version sometimes called the *Ruby* or the *Eibar-type* was also produced for the French and Italians during 1915 and 1916 by Astra and the following other makers: Domingo Acha, Vizcaya; S. A. Alkarstuna, Fabrica de Armes, established by former employees of Echeverria y Unceta, in Guernica (subcontractors to Gabilondo y Urresti); Azanza & Arrizabalaga, Eibar; Francisco Arizmendi y Goenaga, Eibar; Arizmendi, Zualica y Cia, Eibar; Beistegui Hermanos, Eibar (subcontractor to Gabilondo); Vincenzo Bernedo, Eibar; Eceoiaza y Vicinai y Cia, Eibar (subcontractor to Gabilondo); Hijos de Angel Echeverria y Cia, Eibar (sub-

FIGURE 13–8. The Esperanza y Unceta Astra 400 pistol manufactured for the Spanish army as the Modelo 1921 in 9mm Bergmann-Bayard (9mm Largo). The pistol illustrated here (serial number 23,715) was manufactured in 1924. This blowback pistol weighed 1,061 grams and was 225 millimeters long overall (150-millimeter barrel; rifling twist 6-right). *(Krcma)*

FIGURE 13–9. Disassembled view of Spanish 9mm Modelo 1921 self-loading pistol (serial number 23,715). *(Krcma)*

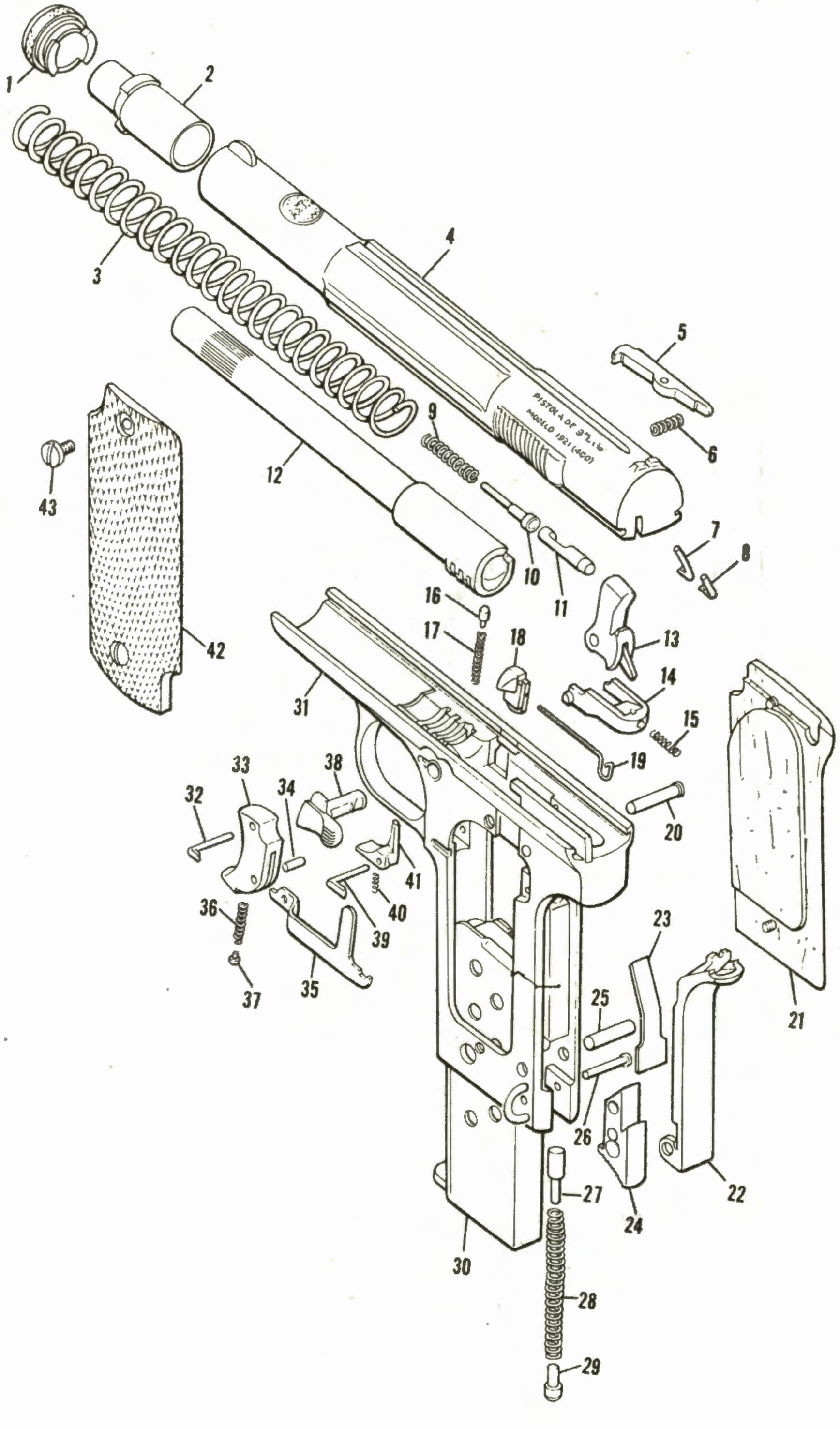
contractors to Gabilondo); Bonifacio Echeverria, Eibar; Erquiaga y Cia, Eibar; Antonio Errasti, Eibar; Esperanza y Unceta y Cia, Guernica; Gabilondo y Urresti, Guernica; Isidro Gaztañaga, Eibar; Bruno Salvaverria y Cia, Eibar (subcontractors to Gabilondo); Modesto Santos (through Les Ouvries Reunies), Eibar; Retolaza Hermanos, Eibar; Urrejola y Cia, Eibar; S. A. Royal Vincitor, Eibar; and M. Zulaica y Cia, Eibar.

The French army's insatiable appetite for pistols was the reason so many weapons manufacturers could exist side by side—there was work enough for everyone. Gabilondo y Urresti alone received an open-ended contract early in 1915 for 10,000 of their particular Ruby-pattern pistols (introduced in 1914) per month. Within six months, that figure was increased to 30,000 per month. Since they could not meet the production schedule, Gabilondo subcontracted with five other local arms makers. And still the French demanded more, as did the Italians. Several of these firms used these foreign contracts to establish themselves in the handgun business for the next two decades.

On 25 November 1914, the company adopted the Astra name and began assigning numerical designations to their handguns. The *Astra 1911*, for example, was the new name for the 6.35mm version of the Victoria. In 1920, a new Astra pistol came out of Esperanza y Cia's workshops—the *Model*

*The Spanish civil war and more stringent government regulations forced many of these newer firms out of business in the late 1930s and early 1940s, but Bonifacio Echeverria (Star), Gabilondo y Cia (Llama), and Esperanza y Unceta (Astra) are still active in 1980.

FIGURE 13–10. ***Republica Española*** **copy of the Modelo 1921 made during the Spanish civil war (1936–1939), serial number 8302. *(Krcma)***



1. Barrel bushing lock
2. Barrel bushing
3. Recoil spring
4. Slide
5. Extractor
6. Extractor spring
7. Firing pin retainer pin
8. Extractor retainer pin
9. Firing pin spring
10. Firing pin
11. Firing pin extension
12. Barrel
13. Hammer
14. Sear
15. Sear spring
16. Safety catch detent
17. Detent spring
18. Slide stop
19. Slide stop spring
20. Hammer pin
21. Right grip
22. Grip safety
23. Grip safety spring
24. Magazine catch
25. Grip safety pin
26. Magazine catch stop
27. Upper spring plunger
28. Hammer spring
29. Lower spring plunger
30. Magazine
31. Frame
32. Trigger pin
33. Trigger
34. Trigger bar pin
35. Trigger bar
36. Trigger bar spring
37. Spring plunger
38. Safety catch
39. Magazine safety pin
40. Magazine safety spring
41. Magazine safety
42. Left grip
43. Grip screw

FIGURE 13–11. An exploded view of the 9mm Largo Modello 1921 (Astra 400) pistol. *(Hoffschmidt)*

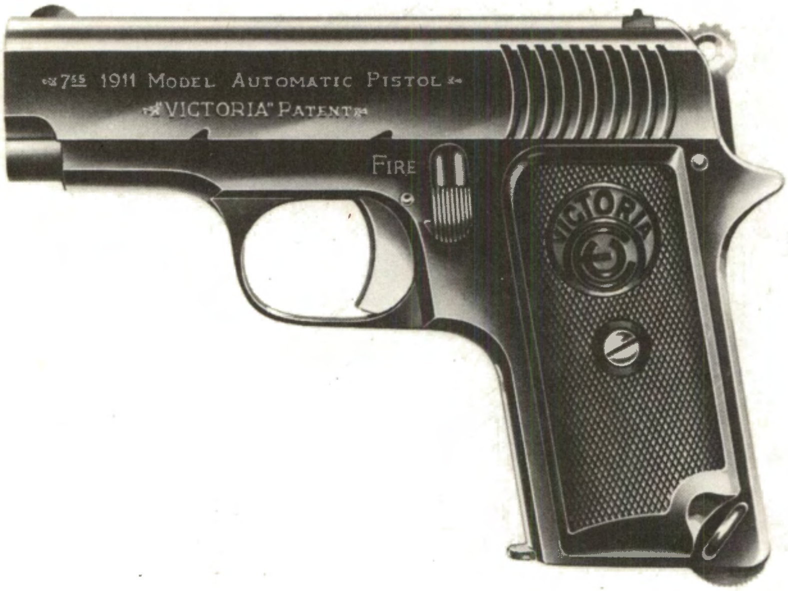


FIGURE 13–12. The *Victoria* pistols as manufactured by Esperanza y Unceta, 1908 to 1914. *Top,* the 6.35mm Browning model; *bottom,* the 7.65mm Browning model. *(Astra)*

200, a copy of the Browning Model 1906. Between 1920 and 1967, 159,475 Model 200s were manufactured, some carrying designations such as *1924 Model,* indicating their year of manufacture. Other significant pre-1945 Astra self-loaders include the Model 300, 400 (Modelo 1921), 600, 900, 902, 903, and *F* Model. (Pistols with 1000 to 5000 model numbers were made after 1945.)

Model 300

A smaller version of the Model 400, this pistol was chambered for either 7.65mm or 9mm Browning. Between 1923 and 1947, 171,300 of this type were made, with 85,390 (63,000 in 9mm Kurz and 22,390 in 7.65mm) being sold to the German Luftwaffe from 1941 to 1944. During the war, this model was called the *Pistole Astra 300* by the Germans.

Model 600

A 9mm Parabellum version of the Model 400, the Model 600 had a 16-millimeter-shorter barrel. A total of 10,450 were delivered to Germany before the French took control of the Spanish-French border from the Nazis in 1944. Some 28,000 Model 600s went undelivered. In Germany, this pistol was called the *Pistole Astra 600/43,* and after the war it was used by German police as the *P3.* Its World War II era price was 31.70 reichsmarks (about $15.50) for the Model 300 and 43.90 reichsmarks ($21.50) for the Model 600.[7]

Model 900

In the late 1920s, several Spanish arms makers decided to manufacture copies of the Mauser C96 pistol to satisfy the

FIGURE 13–13. A typical Ruby-type self-loading pistol of the kind purchased by the French from 1915 to 1918. This one, the *Vesta*, was made by Hijos de A. Echeverria, Eibar (serial number 144,427). *(Smithsonian)*

market for pistol-carbines created by the warlords in China. Under the terms of the Treaty of Versailles, Mauser was forbidden to export military small arms. As Nelson and Musgrave point out in *The World's Machine Pistols and Submachine Guns,* an embargo on rifle shipments to China by the major powers, encouraged and supported by Japan, had led to the increased popularity of Mauser-type pistols equipped with shoulder stocks. The powerful 7.63 × 25mm Mauser cartridge made these weapons very effective.[8]

Unceta y Compañia began preparations to make the Model 900 in 1927, with actual production starting the next year. While quite similar to the Mauser C96 externally, the pistol had been reworked to simplify its mechanism and make it easier to manufacture. Instead of employing the hollow Mauser-type frame into which the lock-work mechanism was inserted as a complete unit, the Unceta designers had devised a removable side plate and a lock work, the components of which could be pinned in place. Cleaning was accomplished by removing the side plate, and maintenance was done only in rear echelon depots. This inability to repair the pistol in the field was likely not a serious disadvantage in China—damaged or inoperative weapons were generally discarded on the field, and functional ones acquired, often stolen, to replace them. In fact, these great losses on the battlefield allowed Unceta and its competitors to sell many Mauser-type self-loaders in Asia.

Although the barrel, barrel extension, bolt, and frame of the Model 900 were similar to the Mauser C96, the method of locking was different. Modifications required the addition of a new and separate barrel return spring. The bolt was pinned to the barrel extension, and it was forced to engage (lock) the bolt by the spring-loaded trigger bar. When the pistol was fired, the bolt was locked to the barrel extension assembly until the rear end of the bolt lock struck a transverse piece in the frame. This blow forced the bolt lock downward and out of engagement; the bolt was then free to continue to recoil on its own after the barrel extension assembly came to a halt. The downward thrust of the bolt lock acted on the trigger bar and thus functioned as a disconnector. With this arrangement, the pistol would fire only a single shot with each pull of the trigger, and the pressure on the trigger would have to be released before the Model 900 could be fired again. The barrel return spring powered the barrel and bolt assembly during the closing cycle.

About the same size as the Mauser C96, the Astra 900 was slightly heavier—1,105 grams for the Mauser, 1,200 for the Astra. This was largely due to manufacturing differences and the heavier weight of the Astra barrel and barrel extension. Production of the Model 900 began in 1928 and continued until early in the civil war (1937) when exportation of handguns was made impossible. Unceta's total production of this series (variants discussed briefly below) was 34,325, of which about 30,000 were exported to China. Existing stock was subsequently utilized by the Nationalist Guardia Civil.

MODEL 901 Unceta's Astra 901 was the first selective-fire model in their 900 series. It could fire single shots or fully automatic bursts. This machine pistol was introduced in 1928, a year after design work had been completed on the semiautomatic Model 900. Externally, the 901 can be distinguished from the 900 by its larger hammer and pistol grip. Both the Model 900 and 901 had 140-millimeter barrels and 10-shot integral magazines, but the 901 was about 50 grams heavier. The major difference between the two was the addition of the selector mechanism, which was located on the right side of the frame above and behind the trigger. By pushing it upwards to "10", for automatic fire, a cam held the trigger bar out of engagement with the sear. Without it acting

FIGURE 13–14. The Astra Model 300 blowback pistol, which was produced in 7.65mm and 9mm Browning. It weighed 560 grams and was 165 millimeters long overall (90-millimeter barrel, rifling twist, 6-right). *(Astra)*

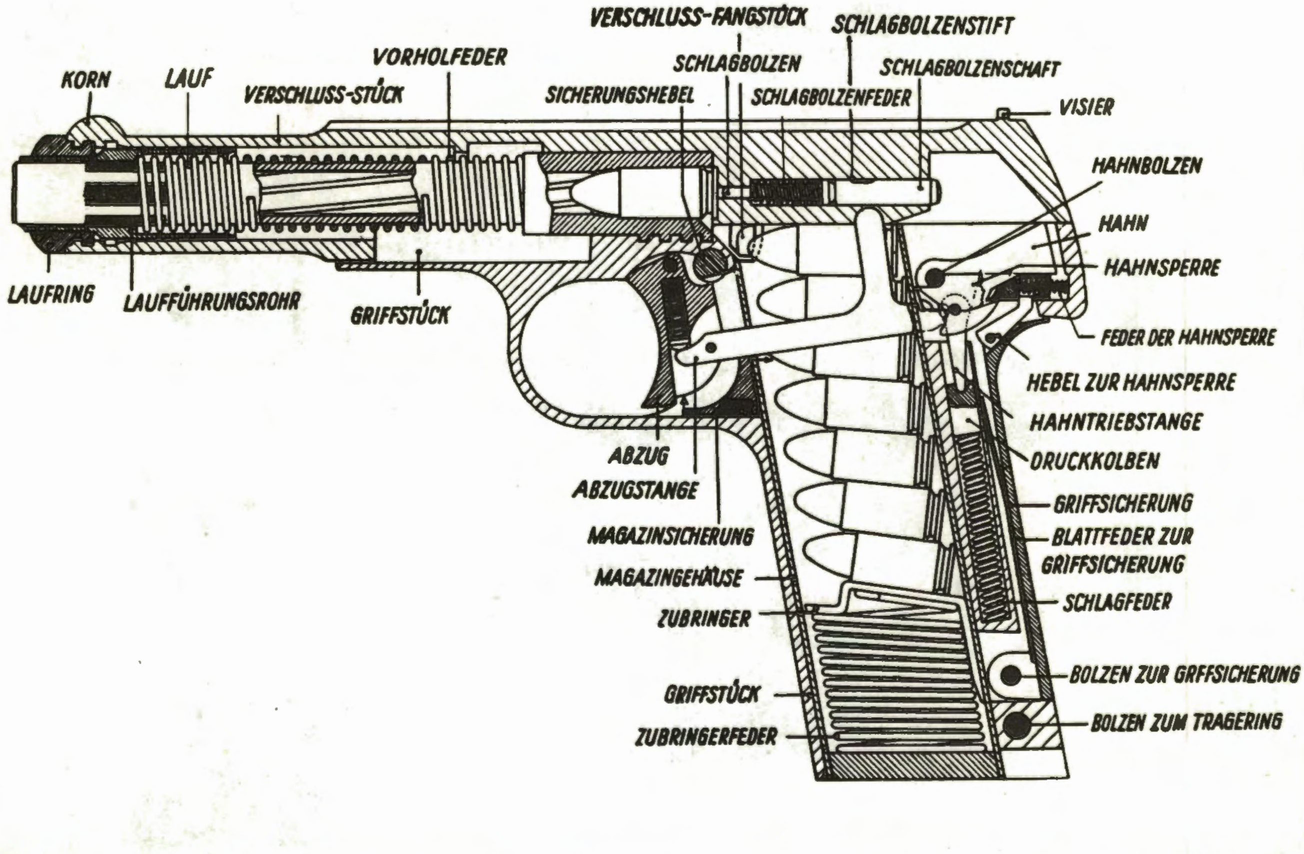


FIGURE 13–15. The 9mm Parabellum Astra Model 600 made for the German military, 1942 to 1944, as the *Pistole Astra 600/43*. (*Astra, Tokol*)

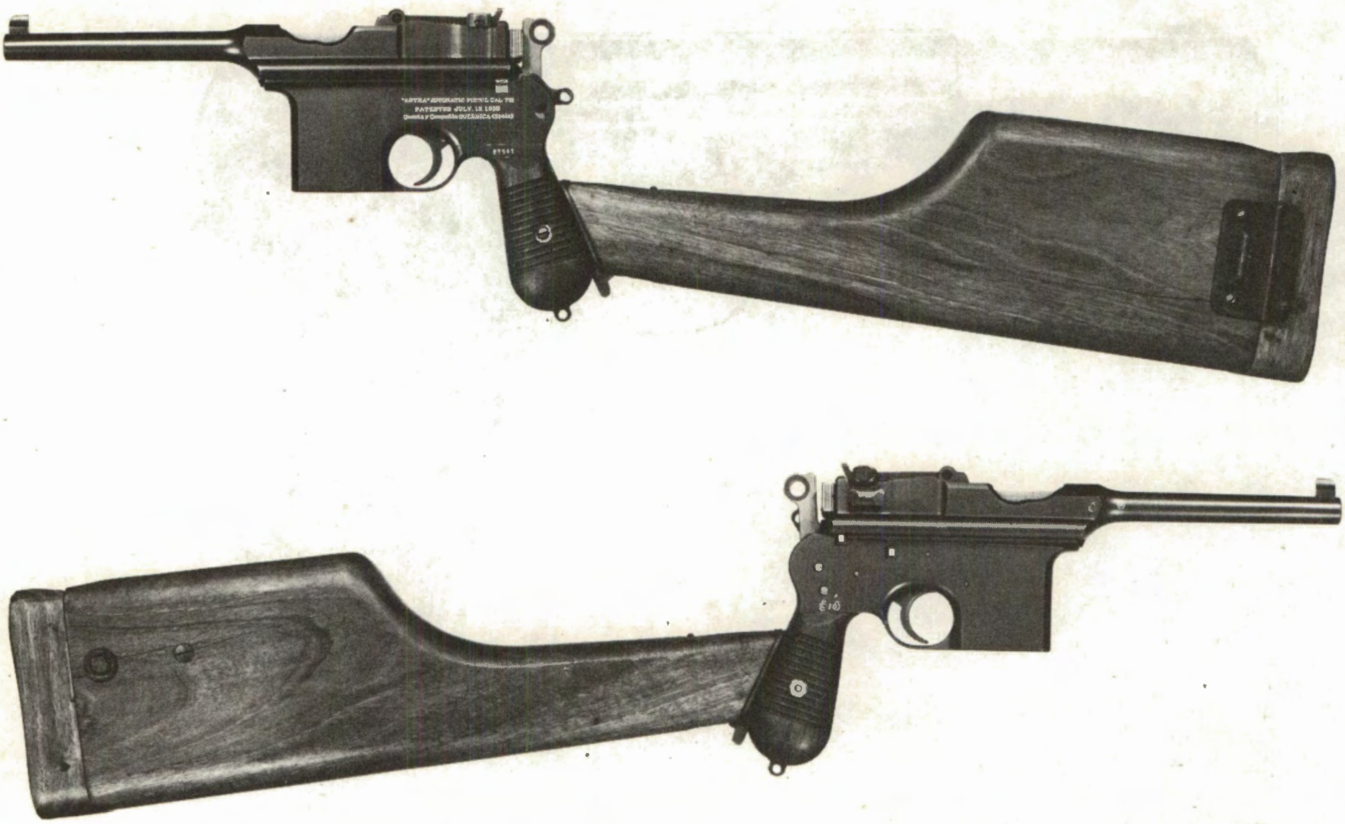


FIGURE 13–16. A late-production version of the 7.63mm Mauser caliber Astra Modelo 900 self-loading pistol. This specimen (serial number 27,941) is marked on the side plate " 'ASTRA' AUTOMATIC PISTOL CAL 763/PATENTED JULY 12, 1928/Unceta y Compania GUERNICA (Spain)." With the stock, this 290-millimeter pistol measures 690 millimeters; it weighs 1,260 grams alone, 1,700 grams with stock. This locked-breech, recoil-operated pistol has a modified Mauser C96 method of locking and came equipped with a 10-shot integral box magazine. *(Krcma)*

FIGURE 13–17. Side plate markings on an Astra Model 900 (serial number 27,654). The Chinese characters read "Made in Spain." *(Krcma)*

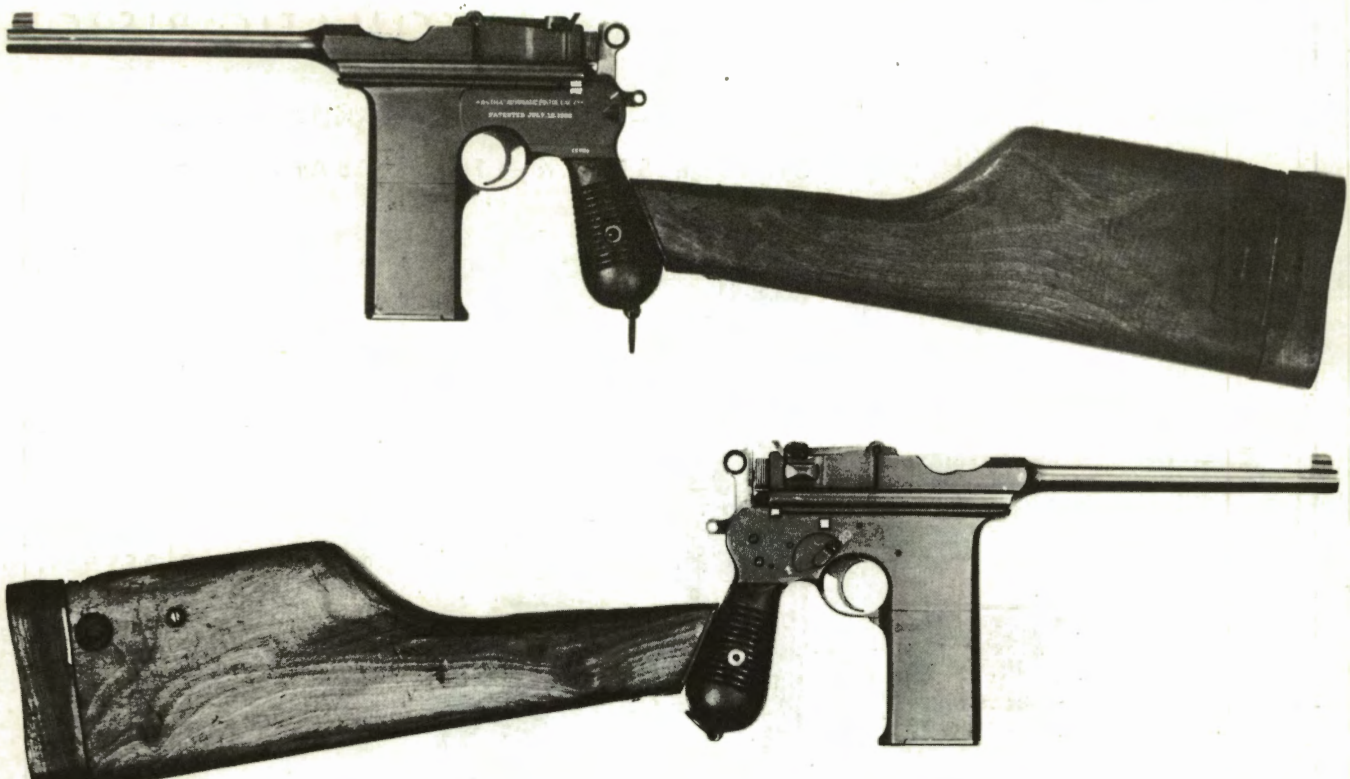


FIGURE 13–18. The 7.63mm locked-breech, recoil-operated Astra Model 902 (serial number 12,603). This selective-fire pistol with its fixed 20-shot magazine had a modified Mauser C96 method of locking. It measured 330 millimeters alone (barrel 180 millimeters; rifling twist, 6-right) and 730 millimeters with its stock; it weighed 1,530 grams alone, 2,105 with stock. *(Krcma)*

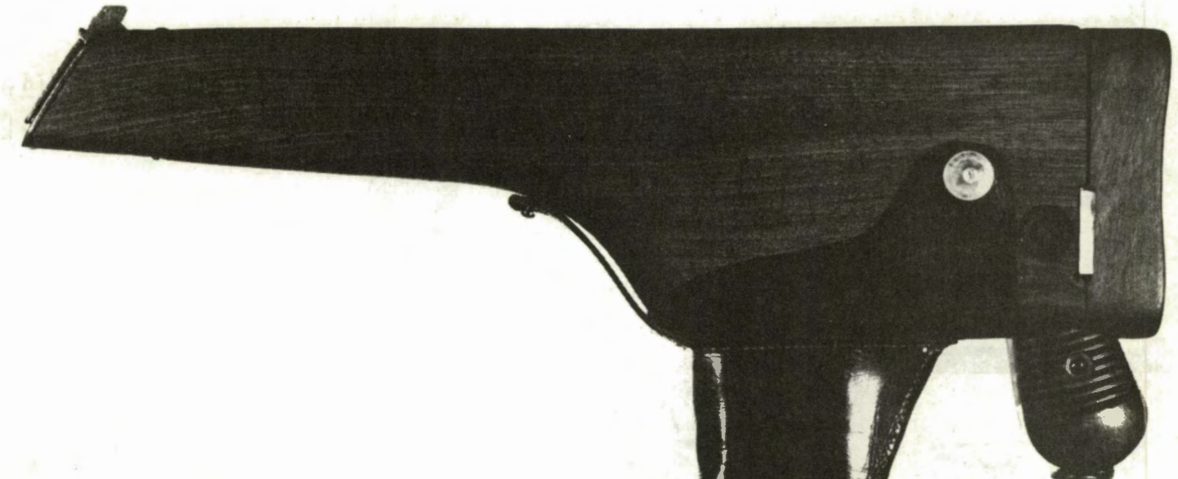


FIGURE 13–19. An Astra 902 in its shoulder stock-holster. Note the leather attachment necessary to cover the extended 20-shot magazine. *(Krcma)*

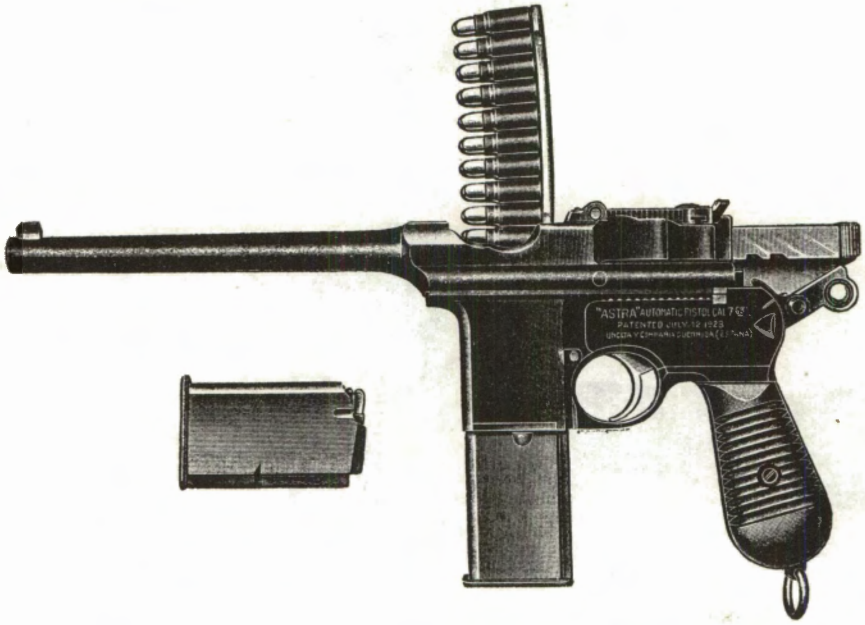
as a disconnector, the pistol fired automatically until the trigger was released. When set on "1," the pistol functioned semiautomatically like the Model 900.

MODEL 902 Introduced by Unceta in late 1928, the Model 902 became a very popular pistol because of its larger magazine capacity (20 shots) and longer barrel (180 millimeters versus 140 millimeters). The Model 902 had an integral magazine that had to be charged by using a Mauser-type loading clip. Otherwise, these pistols were the same as the 901.

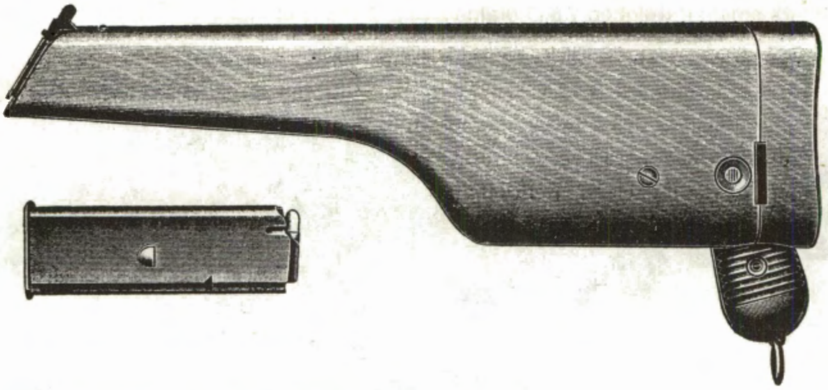
MODEL 903 First offered for sale in about 1932, the Model 903 can be distinguished by its 10- and 20-shot detachable magazines. In manufacturing it, the Unceta engineers mod-

ASTRA 903 AUTOMATIC PISTOL

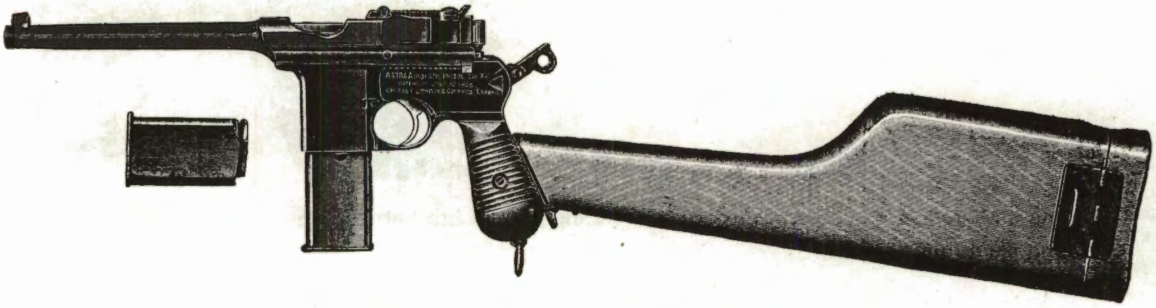
CAL. 7.63 m/m (.300) WITH INTERCHANGEABLE 10 AND 20 ROUND MAGAZINE AND DETACHABLE STOCK.—160 m/m BARREL (6,3")



The pistol ready for loading from top per clip, with the 20 round magazine placed and the 10 round magazine separated.



The pistol resting in holster-stock



The pistol with holster attached.

EXCELLENT FIREARM FOR ALL MILITARY AND POLICE SERVICE AND FOR PROTECTION OF PUBLIC INSTITUTIONS, BANKS, ETC., AND ALSO FOR BIG GAME HUNTING

FIGURE 13–20.

ASTRA 903 ***************

AUTOMATIC PISTOL

CAL. 7.63 m/m (.300) WITH INTERCHANGEABLE 10 AND 20 ROUND MAGAZINE AND DETACHABLE STOCK. — 160 m/m BARREL (6,3")

Encouraged by the extraordinary success of our Pistol «ASTRA 902» due to its caracteristic advantages of, «LONG SHOOTING RANGE», «ACCURACY», «RESISTANCE», «REDUCED WEIGHT AND SIZE», we constructed the new and improved «ASTRA 903», which embodies the same features with the additional novelty of alternative methods of loading per clip and per detachable magazine. The arm is working as a semi automatic repeater in «Single Fire Shooting». A sight graduated from 50 to 1.000 meter permits exact shooting on any desired range within this limit. Maximum shooting range 2.200 m.

Experience has proved the preponderance of light and reduced types of firearms to the bulky and weighty weapons in particular in military operation and police practice. There is no arm so suitable and so dependable as the «ASTRA 903» in war practice for the military forces whose task is not the offensive engagement, and above all in instants of imminent danger, it is of unsurpassable value.

In spite of the very high pressure developed by the cartridge cal. 7.63 (.300"), the arm is of boundless duration. It is composed of a small number of very solidly constructed parts, warranting interchangeability. All parts are evenly balanced, made of best steel and hardened to the required degree, so that breaking and erosion are practically impossible. The following extract of an information, issued by a Commission appointed by the Spanish War Ministry, is intended to render conspicuous the eminently high capacity of resistance:

«TEST OF ENDURANCE: With one pistol taken out of the lot 10.000 cartridges were shot in Quickfire with water cooling. During this test no interruption was observed. After finishing the 10.000 shots, one group has been shot from 10 to 30 meters from target, the pistol fastened to a rack, obtaining the following spread: horizontal 50 mm. and vertical 68 mm. without bullets passing this line. The test at a whole is one of the hardest and gives a very favorable result as well in the measured erosion as in accuracy. Finishing the test one group has been fired on plates of carbonic steel at 20 m. distance obtaining clean perforation on plates of 2,75 mm».

The Pistol «ASTRA 903» is constructed without any screw. The mechanism is very simple and can be taken to pieces and reassembled in a few seconds without need of tools.

Constructive Data.

Calibre	7,63 mm. (.300)
Length of Pistol with holster attached	685 mm. (27")
Length of Pistol	308 mm. (12.1")
Length of barrel	160 mm. (6,3")
Thickness of Pistol	32 mm. (1 1/4")
Height of Pistol	150 mm. (5.9")
Weight of Pistol	1.275 gr. (2 lb. 13 oz)
Weight of 10 round magazine	95 gr. (3 3/8 oz.)
Weight of 20 round magazine	145 gr. (5 1/6 oz.)
Weight of holster-stock	625 gr. (1 lb. 6 1/8 oz)
Number of grooves	6

Ballistical Data.

Muzzle velocity	461.28 m/sec. (1.512 ft/sec.)
Muzzle energy	51.7 mkg. (374 ft/lb.)
Extreme gas pressure	1.827 kg. cm.^{2}

Penetration.

IN PLATES OF CARBONIC STEEL:

at 20 m.	3 mm.
at 30 m.	2,75 mm.

IND SOLID PINE:

at 30 m.	0,415 m.
at 50 m.	0,263 m.
at 100 m.	0,171 m.
at 200 m.	0,134 m.

SPREAD OF 10 SHOT GROUPS:	Vertical	Horizontal
at 20 m.	5 cm.	4 cm.
at 50 m.	15 cm.	11 cm.
at 100 m.	25 cm.	20 cm.
at 200 m.	45 cm.	36 cm.
at 500 m.	150 cm.	125 cm.

Sight graduated up to . . 1.000 m. (1.094 yards)

Maximum range of bullet. 2.200 m. (1 mile 646 yards)

FIGURE 13–20. (continued)

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DIRECTIONS

SAFETY

The safety lever acts directly on hammer and bolt, which are fixed when lever is standing upwards and remain immovable unless safety is released. When lever stands upwards the letter «S» appears, indicating that the arms is made safe. When the safety lever is turned downwards both, hammer and bolt are released, the letter «S» disappears and the initial «F» becomes visible, as a sign that the arm is ready for fire.

Loading.

THE AUTOMATIC PISTOL «ASTRA 903» can be loaded by any one of these two systems

1) loading per separated magazines, as in other automatic pistols:

2) per loading clips, to be introduced from top into the magazine.

* * * * * * * *

1) If proceding acording to the first system, the magazine is loaded, inserting the cartridges one by one, entering with the bottom pressed under the lips. The magazine thus loaded is entered into the corresponding cavity of the frame and pushed upwards until it is hold by the magazine stop. To enter the first cartridge into the chamber of barrel, the safety lever must be placed on «F» and the bolt pulled backwards, then let go, it will return to its natural position by proper tension, pushing the first cartridge into the chamber. The arm is ready for fire. The offensive power of the pistol canbe improved, replacing with another in the magazine the cartridge which is now in the chamber. If the arm is not going to be used inmediately, the safety lever must be placed on «S».

* * * * * * * *

* * * * * * * *

2) If opting for the system of loading on clips, first the safety lever to be placed on «F», then cock the hammer pull backwards the bolt as far as it goes, until it is hold back by the locking stop. Now the lock remains open and the pistol is ready to be loaded. The loaded clip is then introduced vertically into the slots cut into the sides of the bolt casing as shown in illustration No. 1. By downward pressure with the thumb of the left hand, applied near the botton end of the uppermost cartridge, the cartridges are slid into the magazine. The clip is withdrawn and if the pistol is provided with the 20 round magazine, another clip of 10 cartridges inserted and loaded into the pistol. After clip is withdrawn, pull backwards the bolt, then let go, it returns to its natural position by proper tension, pushing at the same time one cartridge into the chamber and making the pistol ready for fire.

TAKING TO PIECES

- ***Removal of Magazine.***

  The magazine is driven out of the corresponding cavity by pressure of a spring, which is released when applying slightly on the magazine stop button placed on the right of the frame.

- ***To Uncover the Mechanism.***

  Placing the safety lever in line with the groove marked on the sliding cover and pulling slightly backwards the barrel, remove hind bolt and place safety lever on its uppermost position. Pull of the sliding cover by means of a slight pressure backward. The interior mechanism is now uncovered.

- ***Stripping of Frame.***

  Placing the safety lever on «F» and pulling slightly backwards the barrel, extract the round headed bolt, placed in center of the frame. Let now the barrel advance by pressure of the stop spring and both principal parts are separated, frame and barrel.

- ***Remove Safety Lever.***

FIGURE 13–20. (continued)

REASSEMBLING

Putting the Safety into its Place.

Insert the safety lever with its axle into its place and put it in position of «fire».

Connecting of Frame With Barrel.

Insert the frame with the barrel stop spring into its corresponding cavity in the barrel and pressing still more forward and slightly upwards it will enter with its grooves into the corresponding tongues of the barrel. Pull the barrel backwards as far as it goes and enter into its place the round headed bolt, now put the safety lever in upright position «S». Push into its grooves the sliding cover and placing the safety lever on line with the notch marked on the said cover, take barrel backwards as far it goes and sheath the hind bolt into its hole. Enter the magazine and now the pistol is ready for use.

Equipment.

Each pistol is furnished with the following accessories:

1 holster stock of finest walnut.
1 10 round magazine.
1 20 round magazine.
1 cleaning rod.
1 spare bolt spring.

Packing.

Strong tinlined export cases of 25 complete pistols with accessories. net weight 56 kg. (121 lb). gross weight 88 kg. (194 lb). Measures: 105 x 52 x 36 cm. (41 1/2" x 20 1/2 x 14,2")

Ammunition.

Cartridges cal. 7,63 mm. (.300)
1 case containing 5.000 pieces on clips per 10 cartridges;
measures: 57 x 37 x 25 cm. (22 1/2" x 15" x 10")
Net weight 58,500 kg. (129 lb.), gross weight 70 kg. (150 lb.)

Prices.

«ASTRA 903» automatic single and machine fire pistol cal. 7,63 mm. (.300), with holster stock . .
1 10 round magazine, 1 20 round magazine .
1 cleaning rod and 1 spare bolt spring . . .

ACCESSORIES AND SPARE PARTS:

1 10 round magazine . .
1 20 round magazine . .
1 holster stock . . . .

ASTRA

FIGURE 13–20. (continued)

ified the forward portion of the frame to permit use of detachable magazines. A very small number of 903s were chambered to fire the 9mm Largo cartridge, in addition to the standard 7.63 × 25mm Mauser. A Model 903E was subsequently introduced, differing from the regular 903 in minor changes to the magazine catch and loading platform.

MODEL F This pistol, developed at the request of the Guardia Civil, was manufactured in only 9mm Largo, the official Spanish government pistol cartridge. It apparently evolved from the Astra Model 904, which was never produced for export because of restrictions placed on the arms industry during the period of the Republic (1931–1936) and the civil war. The most significant aspect of this pistol's design, since it was a rework of the basic 900 series, was the mechanical rate reducer that slowed its cyclic rate of fire when set on automatic. Located in the lower portion of the pistol grip, the rate reducer consisted of a flywheel device, which was activated by a linkage to the hammer. This retarder flywheel caused the hammer to fly forward at a slower rate, and the Model F shot 350 rounds per minute instead of 900. A relatively simple mechanical device, the rate reducer made the pistol controllable when shot fully automatically and permitted the shooter greater accuracy. Because of the civil conflict, production of this pistol was short-lived, and only about 950 were delivered to the guard in June 1935 (serial numbers 29,701–30,650). The remainder, about 150 guns, fell into the hands of the Basque government in July 1936 when the Republicans took control of the northern small arms factories.

The Astra Pistol in the Far East

Nelson and Musgrave in 1977 uncovered many details of the Astra marketing story, a portion of which is presented here in summary form. In about 1927, Unceta y Compañia hired a multilingual German, Ernst Borcher, to be their export sales manager. That February, Borcher set out for the Far East to make a market survey of potential customers in Japan and China. It was a hard trip to China over a circuitous route (Guernica to Paris to Cologne to Berlin to Warsaw and thence to Harbin in China via the Trans-Siberian Railroad). After 21 days on the road, he spent a day in Harbin before pushing on for Japan, which he reached four days later. Borcher discovered that there was a demand in China for both small 7.65mm Browning-type pistols and more powerful 7.63mm Mauser-type pistol-carbines. Unfortunately for the Spanish arms makers, private ownership of handguns had been abolished in Japan in 1923 or 1924. Japanese trading companies, however, controlled the Chinese market.

After talking with various Japanese traders, Borcher encouraged Unceta to push ahead with the production of the Model 900. Nearly all of the Mauser-type 900 series came equipped with the combination shoulder stock-holster so they could be used as pistol-carbines, thereby circumventing the ban on rifle shipments to China. Some 9,050 Model 900s, 1,015 Model 901s, and 3,635 Model 902s were sold to China through Japanese trading houses from January 1928 through April 1931. In the spring of 1931, Unceta y Compañia created the Astra China Company Limited of Shanghai to circumvent the Japanese connection.

One of the many changes brought about by the new Republic in Spain was a more closely supervised, regulated arms industry. The Basques had always wanted independence from the government in Madrid, whatever its political leanings, and the new government moved quickly to occupy all firearms manufacturing shops and factories in the provinces of Vizcaya and Guipúzcoa on behalf of the Ministry of War. An arms seizure commission decided that the govern-

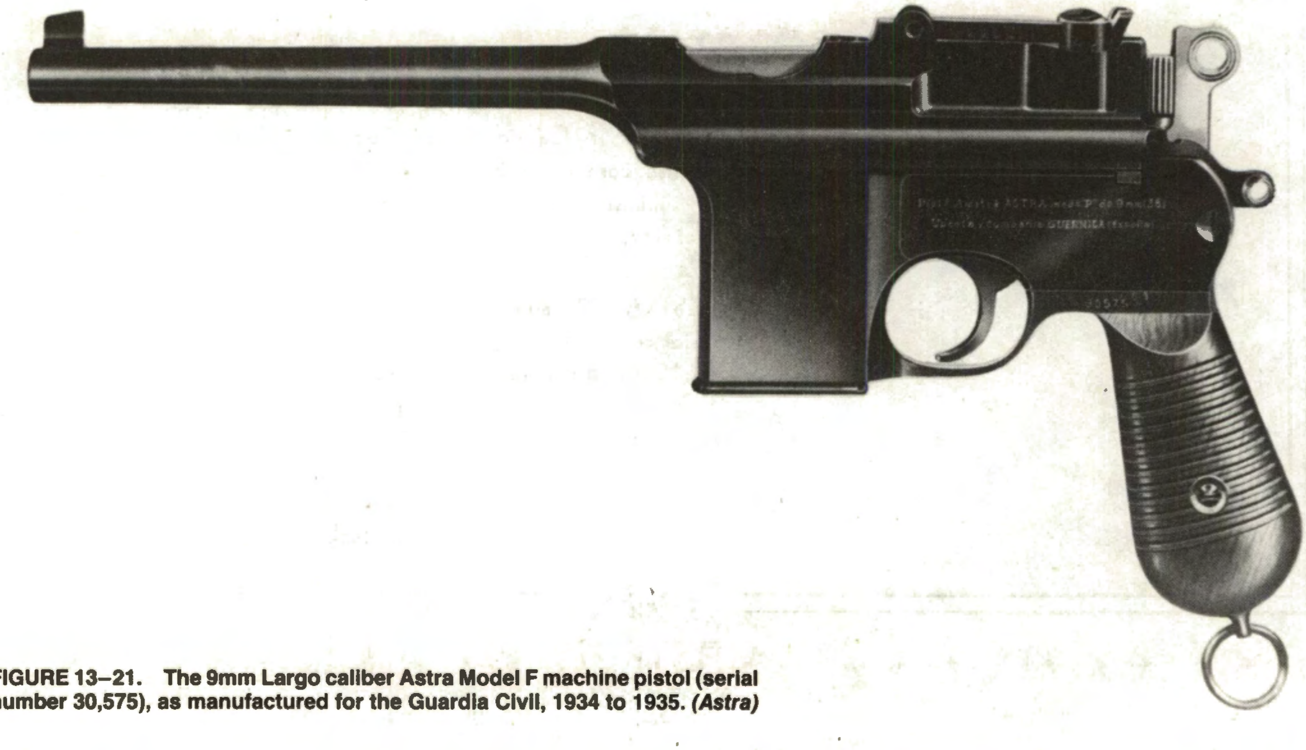


FIGURE 13–21. The 9mm Largo caliber Astra Model F machine pistol (serial number 30,575), as manufactured for the Guardia Civil, 1934 to 1935. *(Astra)*

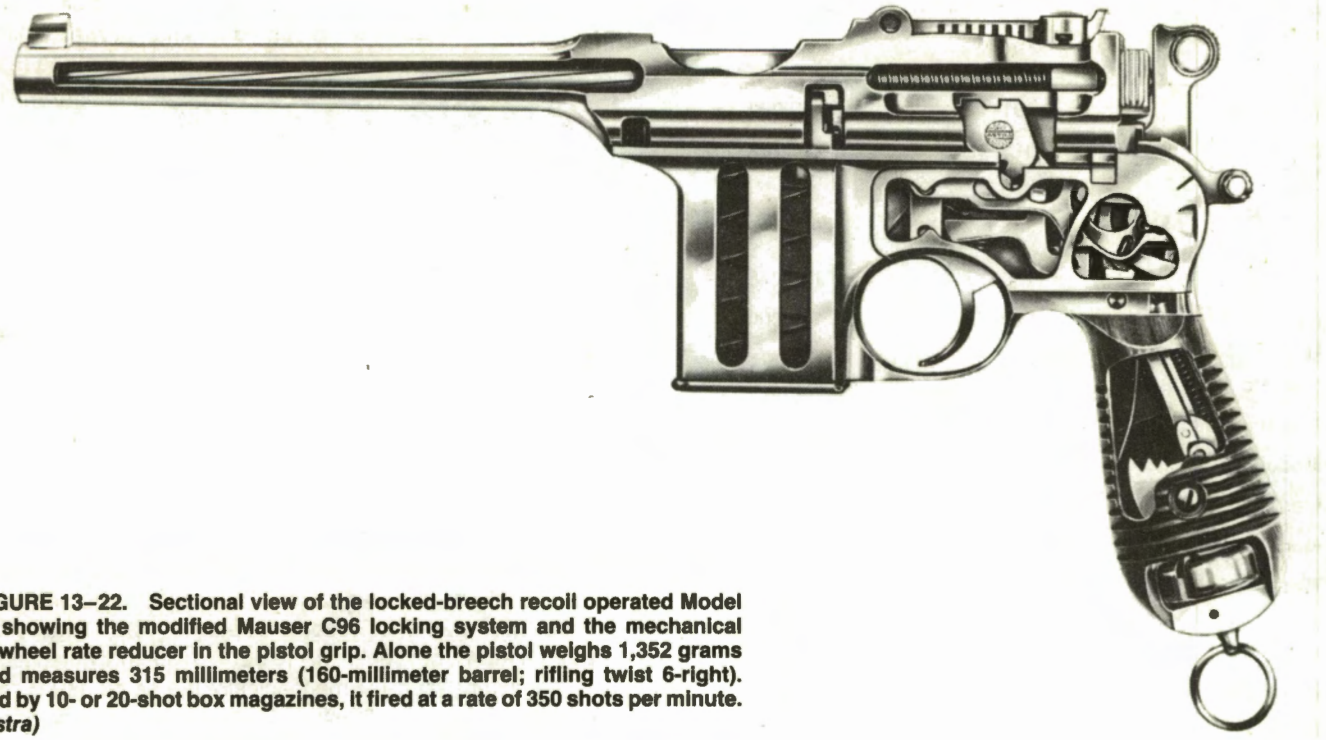


FIGURE 13–22. Sectional view of the locked-breech recoil operated Model F, showing the modified Mauser C96 locking system and the mechanical flywheel rate reducer in the pistol grip. Alone the pistol weighs 1,352 grams and measures 315 millimeters (160-millimeter barrel; rifling twist 6-right). Fed by 10- or 20-shot box magazines, it fired at a rate of 350 shots per minute. *(Astra)*

ment would confiscate only those guns that were of standard military caliber or that were chambered to fire Spanish military ammunition. An inventory of Unceta's warehouses in fall 1931 revealed the following: Model 900s—4,334 finished and 1,850 unfinished; Model 901s—600 finished; Model 902s—796 finished and 1,625 unfinished. The government took only 600 Model 901s and 750 Model 902s, but all subsequent exports of pistols had to be approved on a case-by-case basis. During the years from 1931 to 1936, the Unceta factory at Guernica made 14,675 pistols in the Model 900 series (8,635 900s, 640 901s, 3,440 902s, 1,010 903s, and 950 Model Fs).

By the summer of 1936, life in Guernica had become chaotic. First the region was controlled by the civil government of Vizcaya and later by the Euzkadi forces. Since their sympathies lay with the Nationalists under Franco, Don Rufino Unceta and factory manager José Rodriguez had been moving slowly with the production of pistols ever since Republic forces had occupied the factory on the morning of 28 July 1936. Still, by April 1937, Astra had sold 11,658 pistols worth about $153,000 to the Republicans (2,085 900s, 44 903s, and 150 Model Fs).[9]

In April 1937 as the Nationalist forces under General Emilo Mola Vidal marched toward the Republic strongholds near Guernica, factory owner Unceta was given the order to pack up all his machinery and transfer it deeper into Republic territory behind the city of Bilbao's ring of fortifications where it could be used to manufacture more handguns for the Republicans. Allegedly short of the specialists required to dismantle the machinery, Don Rufino and Don Jose stalled for time. On the 23rd, they were told that Russian technicians were on their way to dismantle the factory for them, but the Republicans' plans were altered by the now-famous Condor Legion bombing raid on Guernica on 25 April. The German Luftwaffe volunteers in the Spanish Nationalist Air Force who attacked the city had never heard of Unceta y Compañia or Astra and missed the only military target. The attack has been described variously as a strike against communists, anarchists, and Republicans; or against innocent civilians. On Monday, 3 May, after the Nationalists had secured the city, the Astra factory was busy once again, this time making guns for Franco.[10]

From 1940 to 1943 during the war that involved all of Europe, Unceta delivered 2,004 Model 903s and 1,050 Model 900s to the German army headquarters at Hendeye, France. With these deliveries, the production of the series was shut down. A 1944 Spanish arms regulation outlawed the private manufacture of handguns and submachine guns capable of automatic fire or designed to take a detachable stock. Such weapons of war could be manufactured only by government establishments. With the exception of a small lot of Model 900s (213) and 903s (359) built from 1950 to 1955, Unceta was forced to quit making this popular series.

Although Unceta y Compañia produced a substantial number of handguns over the years, it was not a particularly huge sum when compared to other manufacturers around the world. Although this Spanish firm was an extremely important manufacturer for Spain and for its export customers in China, it was not in the same league as giants like Colt, DWM, FN, and Walther.[11]

BEISTEGUI HERMANOS

Beistegui Hermanos was founded in 1909 by the Beistegui brothers, Juan and Cosme. Apparently natives of Eibar, Juan

TABLE 13-3 PRODUCTION AT UNCETA Y COMPAÑIA

Model	*Years of Production*	*Total made*
Victoria	**1901–14**	**50,000**
Campo-Giro, 1913, 1913–16	**1912–19**	**14,162**
Eibar Model 1915–16	**1915–17**	**36,000 (est.)**
Model 200	**1920–67**	**159,475**
Model 300	**1923–47**	**171,300**
Model 400 (Modelo 1921)	**1921–45**	**106,175**
Model 600	**1944–45**	**59,546**
Model 700	**1926**	**4,000**
Model 900	**1928–44**	**21,000+**
Model 901	**1928–36**	**1,655**
Model 902	**1928–36**	**7,075**
Model 903, 903E	**1932–44**	**3,437**
Model 904	**1935**	**10**
Model F	**1935–36**	**1,100**
Total 900 series		**34,325**

was the mechanically inclined brother, Cosme the salesman. They got their real start in the handgun business as subcontractors to Gabilondo y Urresti, making the Ruby for the French and Italian military market. It was a small step to obtaining French contracts of their own. In looking around for new handguns to produce after the First World War, the brothers found the Mauser C96 appealing because of the China market. By 1927, Beistegui Hermanos was manufacturing a selective-fire machine pistol patterned after the Mauser. The first models of the *Royal* self-loader were available in about 1926, and a machine pistol version during 1926 and 1927. Most of their early production models (3,500 produced before 1928) were semiautomatic only, but in 1928 they made 15,000 pistols, the majority of which were selective-fire. Production in 1929 was about 4,500. These handguns, the first model Royals, were built between 1927 and 1929—about 23,000 total.

The first model Royal pistols came with 140-, 160-, and 180-millimeter barrels and 10- or 20-shot Mauser-type integral magazines. All pistols were sold with the Mauser-style shoulder stock-holster, and the selector was marked "Normal" for semiautomatic fire and *MF* or *E* for automatic fire. The designer who prepared the Royal for production took pains to simplify the basic Mauser design. For example, it had a cylindrical bolt instead of the Mauser bolt, with its square cross section. The locking block was pinned to the barrel extension, and the whole pistol was held together by two large main screws. That last change simplified disassembly and led to a less expensive unit to manufacture. When fired, the barrel and barrel extenstion assembly recoiled with the bolt locked in place until it came in contact with one of the large screws. The locking block, which was pinned to the barrel extension, was then cammed against a lower locking block, and the bolt was free to continue its travel to the rear. A spring inside the bolt served as the return spring. As with the Astra Model 900 series, most of these Royals went to China through a Japanese trading house, Nippon Boeki (Nippon Trading Company).

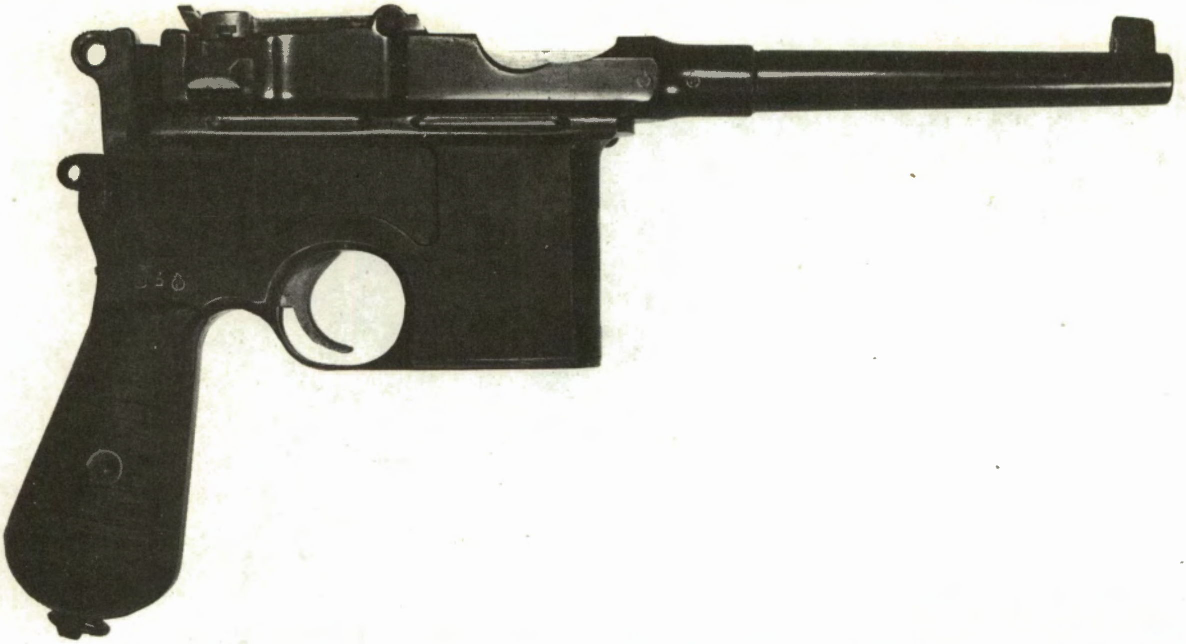
In 1929, the Beistegui firm decided to develop a second model machine pistol, which would be more faithfully patterned after the original Mauser C96. This pistol appeared in late 1929 or early 1930, marketed as the Royal or the MM31. The Beistegui Hermanos design was competitive with the Astra Model 901 machine pistol in Asia. Royal (MM31) serial numbers started at about 23,000 and went to 33,000 by the time it went out of production in 1934. In 1931, the firm was producing about 180 pistols per six-day week. The selling price was about $20 to $22 with the wooden stock-holster.

There were four distinct variants of the MM31: (1) close copy of the Mauser C96 with 140- and 180-millimeter barrels and 10-shot integral magazine; (2) essentially the same as (1), but with a 20-shot integral magazine; (3) mechanically the same as (1), but could use 10-, 20-, or 30-shot detachable box magazines; and (4) mechanically the same as (1), but could use the 10- or 20-shot German Mauser Schnellfeur magazines, as well as its own. The interchangeability feature, which did not exist with the third variant, was probably added to enhance the gun's marketability in China, where Mauser's first Schnellfeur had arrived in the summer of 1931. Eulogio Arrostegui of Eibar marketed this fourth variant internationally as the *Super Azul,* an obscured fact that has often led to much confusion among collectors. Although the Beistegui Hermanos were the first to build a selective-fire pistol in Spain, their production numbers were insignificant when compared to Unceta y Compañia.

In 1934, the Beisteguis introduced a pistol with a reduced firing rate after the style of the Unceta's Model F, but the rate-reducing mechanism was significantly different. By 1934, the brothers had apparently abandoned the manufacture of these pistols. A few thousand were still on hand at the factory when it was siezed by Republican forces in July 1936. The Beistegui Hermanos works burned in 1937, and after the civil war the owners relocated in Vitoria, where they manufactured bicycles.

BONIFACIO ECHEVERRIA (STAR)

This Eibar arms-making firm grew out of a family enterprise. José-Cruz Echeverria, who had specialized in muzzle-loading firearms before the turn of the century, had two sons who came into the business in about 1905—Bonifacio and Julian Echeverria Orbea. In March 1910, Julian left the firm and Bonifacio expanded the manufacturing activities. As with several other Spanish firearms manufacturers, the French and Italian orders for Ruby-type 7.65mm pistols were the boost the company needed to win a permanent place on the Spanish scene. In 1919, Echeverria formally registered the name "Star" and its Basque and Spanish equivalents (Izarra and Estrella) as the company's trademark.



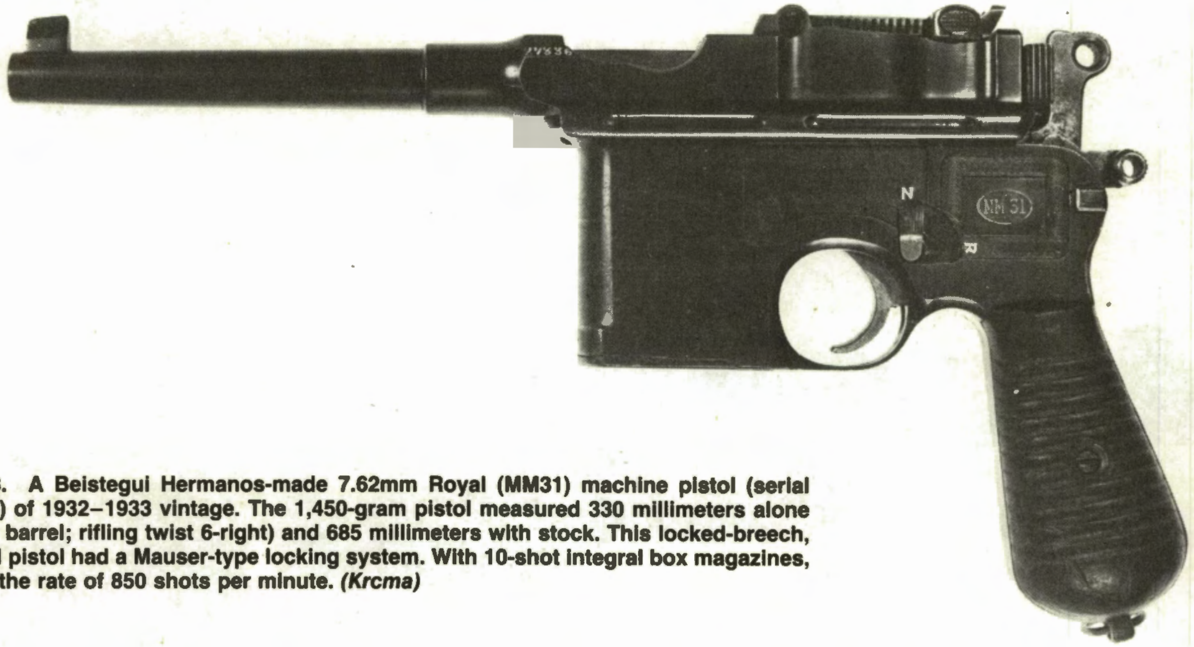


FIGURE 13–23. A Beistegui Hermanos-made 7.62mm Royal (MM31) machine pistol (serial number 27,336) of 1932–1933 vintage. The 1,450-gram pistol measured 330 millimeters alone (180-millimeter barrel; rifling twist 6-right) and 685 millimeters with stock. This locked-breech, recoil-operated pistol had a Mauser-type locking system. With 10-shot integral box magazines, it could fire at the rate of 850 shots per minute. *(Krcma)*

The first Echeverria pistol, the Model 1908, was a 6.35mm model based on the design of the Mannlicher Model 1900 pistol. The Model 1908, production of which began in late 1907, had a fixed barrel, open-top slide, and Mannlicher-type breech and extractor. But there the similarity ended. The pistol grip was different, and the handgun came equipped with a removable magazine instead of a separate loading clip, as used with the Mannlicher. In 1914, Echeverria's people improved the Model 1908 by modifying the slide and adding two knurled projections, which permitted easier grasping of the slide during charging. In both the Model 1908 and the Model 1914, the trigger guard, trigger, and front strap of the frame were removed as a unit from the pistol. After this unit was disassembled, the slide could be disengaged from the barrel and frame assembly. Production figures for these pistols were lost with the factory during the civil war.

Bonifacio Echeverria introduced the military 7.65mm version of the Model 1914 to meet the needs of the French military. The Star Model 1 Military (sometimes called the Model 1919) was used by the Italians along with their Ruby pistols, which Echeverria called the Izarra. In France, the two different models were designated *Pistolet automatique, type Star* and *Pistolet automatique, type Ruby*. The Military Model 1 was essentially the same design as the Model 1914, but it was heavier, more robust, and chambered primarily for the 7.65mm Browning cartridge, although commercial versions were made in 6.35mm and 9mm Browning, too. Production of this model continued until 1929, although it was effectively superseded by improved models during the early 1920s.

At the end of the First World War, Echeverria and his staff were experimenting with improved pistols for the French army. This enclosed-hammer, locked-breech design was scheduled to go into production, but the French cancelled their order for 50,000 guns with the end of the war. Echev-

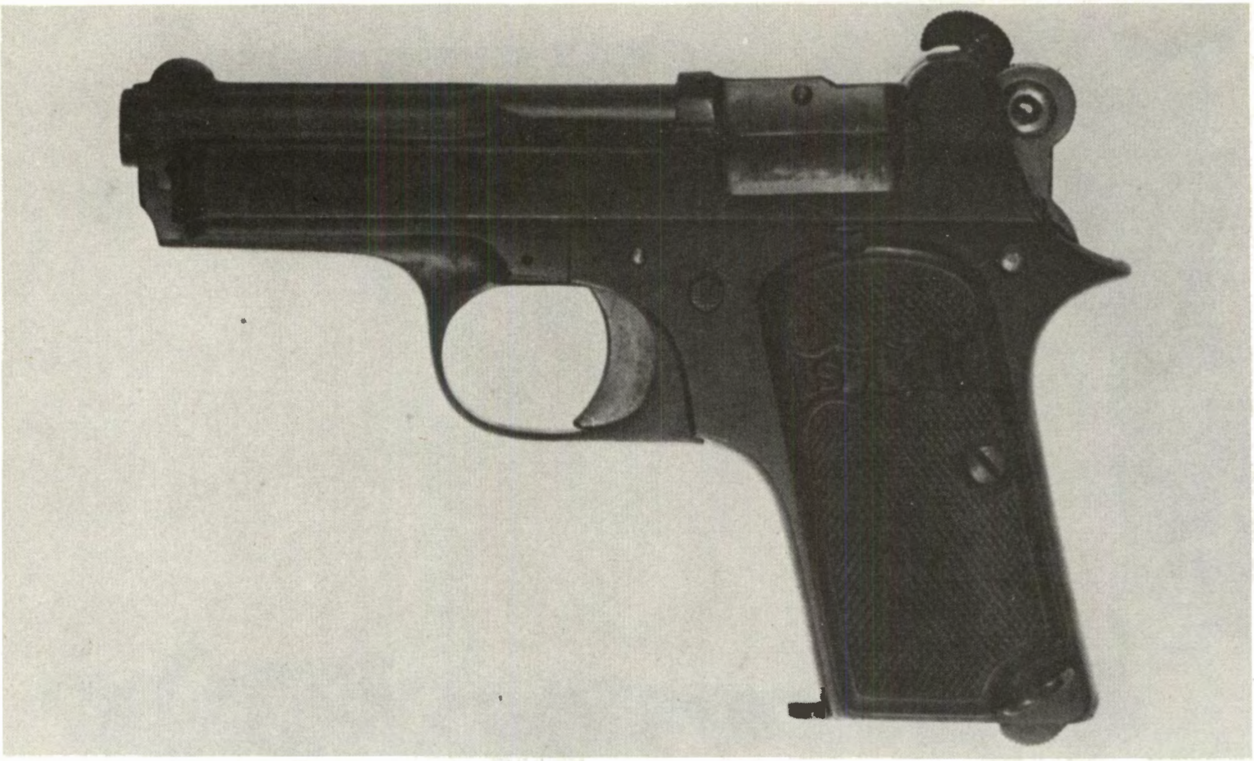


FIGURE 13–24. The 6.35mm Model 1914 pistol manufactured by Bonifacio Echeverria. *(Nonte)*

FIGURE 13–25. The 7.65mm Star Military Model 1, as used by the French in World War I. *(Buigne)*

FIGURE 13–26. The 9mm Largo caliber Star Modelo Militar (1920) pistol built for the Guardia Civil. *(Star)*

erria, looking elsewhere for markets, believed that as a commercial venture a copy of the Colt-Browning would be a safer bet.

Modelo Militar 1921

The *Modelo Militar 1921* was the beginning of the transition from the Mannlicher-type pistols to the Colt-Browning-type. Based on the Colt-Browning swinging-link locking system and slide with external hammer, the Modelo Military had an extractor and breech patterned after the Model 1908 and Model 1914 pistols. In the absence of a grip safety, the designers used an earlier Echeverria safety catch mounted on the right-hand cocking boss, which blocked both the firing pin and the hammer when applied. To appeal to the Spanish military, it was built to fire the regulation 9mm Largo cartridge. This pistol may have been tested against the Modelo 1921 (Astra 400) by the Spanish army, but it was adopted only by the Guardia Civil.

Modelo 1921 and 1922

Still closer to the Model 1911-type Colt, the Modelo 1921 pistol was the only Star model to incorporate a grip safety. It was adopted by the Guardia Civil and chambered for the 9mm Largo. When Guardia officials expressed their dissatisfaction with the grip safety, this feature was eliminated; the handgun was renamed the Modelo 1922. It was declared the standard Guardia Civil side arm on 5 October 1922.

The Modelo 1922 is quite similar to the U.S. Model 1911 pistol, except for the elimination of the grip safety, modification of the trigger mechanism, and utilization of a coil-type hammer mainspring. The trigger was simplified and had only a single bar on the right side of the frame. It bore against a vertical disconnector, which was dovetailed into the outside wall of the frame. When the trigger was pulled to the rear, it bore against the sear bar, which was also mounted on the right side of the frame. All of these changes to the Colt-Browning design simplified the manufacture of the pistol. Echeverria and his people solved the mainspring location problem by using a coil spring in place of the Model 1911 flat leaf spring. The Star mainspring was simply inserted into a vertical hole drilled into the top side solid back strap. The result was a less complicated and easier-to-fabricate gun.

Star-Bonifacio Echeverria SA* manufactured the Modelo 1922 commercially as the Model A in 7.63mm Mauser, 9mm Largo, .38 ACP (9.7mm), and .45 ACP (11.43mm). In 1930, Bonifacio Echeverria was issued a Spanish patent (116,773,

*From the mid-1920s to the mid-1930s, the firm became a joint stock company under the name Fabrica de Armas Star-Continuadora de B. Echeverria. In 1939, after the civil war, the company name was changed to Star-Bonifacio Echeverria SA.

FIGURE 13–27. Star 9mm Largo Modelo 1922 military-type pistol (serial number 7748) used by the Guardia Civil. *(Krcma)*

11 February 1930) for a fully automatic fire-control mechanism for the Modelo 1922(A). The fire selector was located on the right side of the slide; when pushed downward it caused the pistol to fire automatically as long as the trigger was depressed. The fire selector tripped the automatic sear trip and thus caused the weapon to fire continuously.

Apparently only a few Model A selective-fire pistols (called the AD) were manufactured during 1930 and 1931. These were made available in .38 ACP (9.7mm), 9mm Largo, and .45 ACP (11.43mm). In fall 1931, the firm introduced a larger and heavier version of the Model A, which was designated according to caliber. Model M was produced in 7.63mm Mauser, .38 ACP (9.7mm), and 9mm Largo. An *MD* designation indicated the caliber and selective-fire capability. Model P fired .45 ACP (11.43mm). Depending on the customer's requirements, barrels were available in nine lengths ranging from 75 to 200 millimeters, but 160 millimeters was the most common. The heavier frames were a concession to the stresses incurred when using these powerful pistol cartridges automatically.

It did not take Echeverria's staff long to appreciate the fact that their automatic pistols fired too fast. Estimates have been made indicating a cyclic rate of 1200 to 1400 shots per minute. In terms of noise, it was an impressive weapon, but

FIGURE 13–28. Disassembled view of the Star Modelo 1922. *(Nonte)*

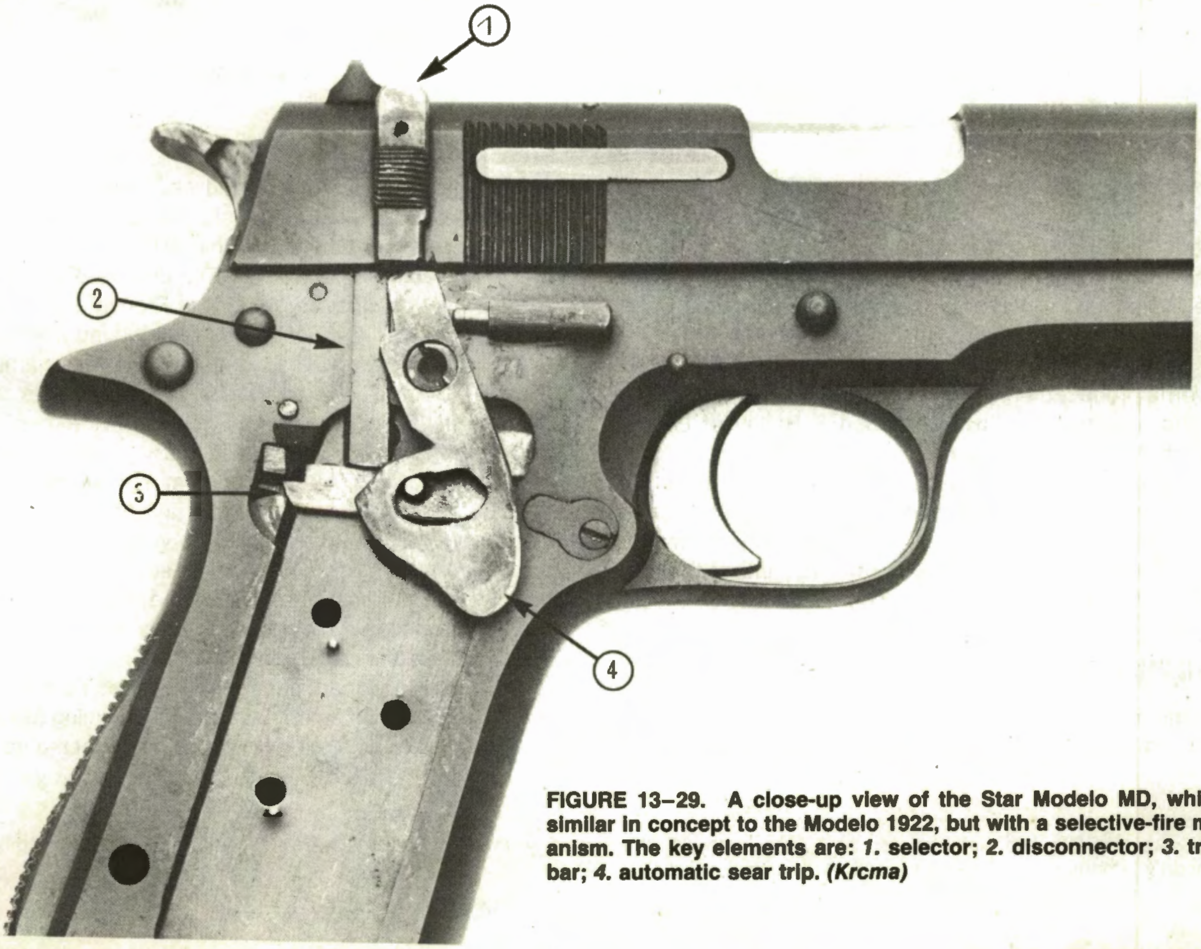


FIGURE 13–29. A close-up view of the Star Modelo MD, which is similar in concept to the Modelo 1922, but with a selective-fire mechanism. The key elements are: *1.* selector; *2.* disconnector; *3.* trigger bar; *4.* automatic sear trip. *(Krcma)*

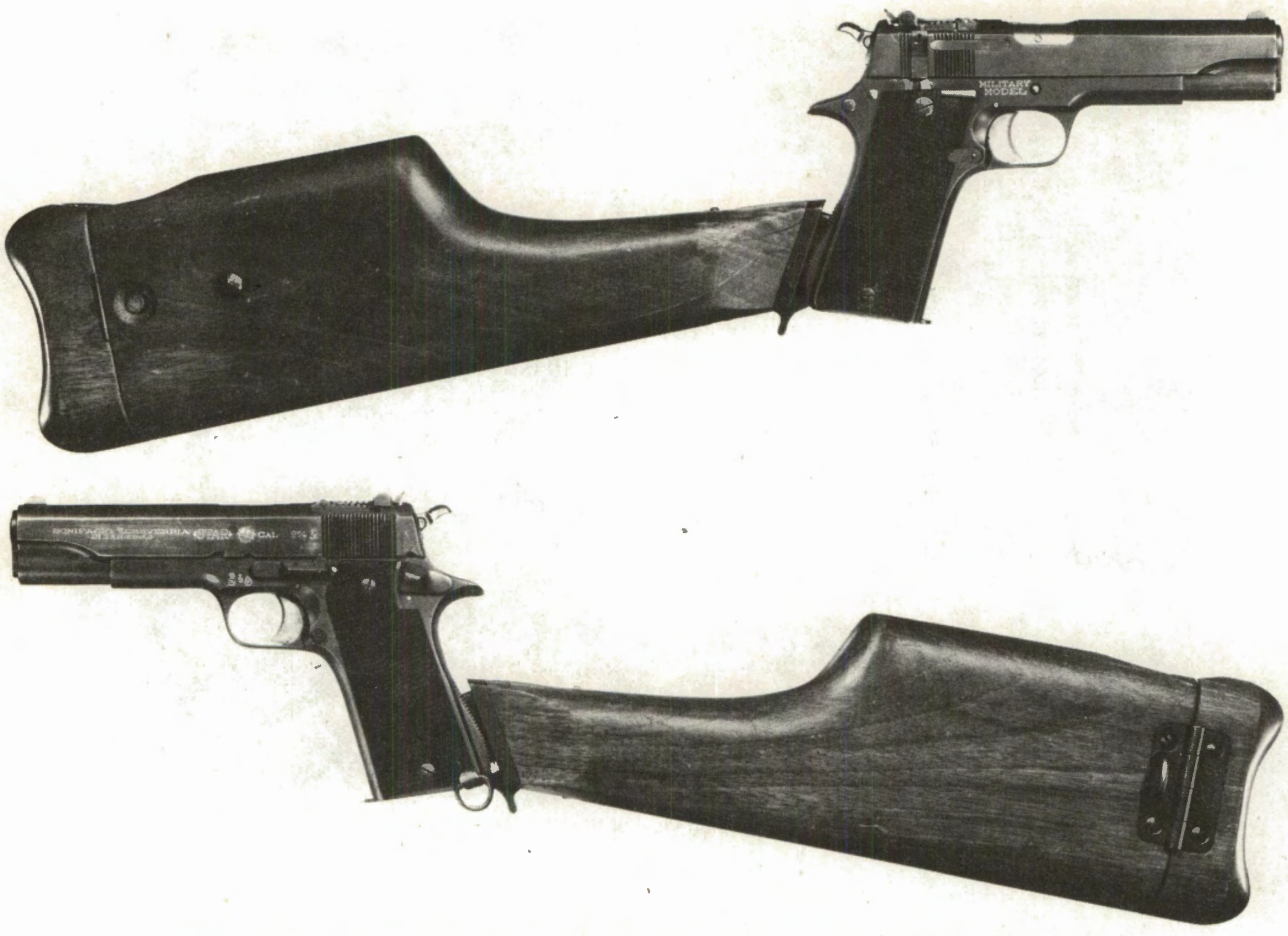


FIGURE 13–30. The 9mm Largo caliber Star MD selective-fire pistol with shoulder stock. ***(Krcma)***

controllability and hence accuracy were sacrificed in the process. As a consequence, Star engineers developed a cyclic rate reducer (Spanish patent 133,526, 17 February 1934). Only a small number of pistols with this device were produced before the civil war. Although mechanically interesting, the Star selective-fire pistols were not especially significant in the overall picture of military handguns. Between 1930 and 1952, Echeverria produced only about 8,000 of these pistols. Siam (Thailand) contracted with Greenwood & Batley of Leeds, Yorkshire, to build a factory capable of manufacturing 20 to 25 of this kind of pistol per eight-hour day; but despite the fact that the factory tooling was delivered to Asia in 1938 at a cost of $119,000, the *Type 80* was apparently not manufactured in any sizable quantities before war came to this part of the world to disrupt production schedules.

GABILONDO Y URRESTI (LLAMA)

The arms-making firm Gabilondo y Urresti was established in 1904 to produce handguns.* After making an undistinguished series of revolvers and self-loaders in the prewar years, Gabilondo finally flourished as a result of contracts with the French. By the end of the 1914 to 1918 war, the firm had manufactured between 150,000 and 200,000 of their *Pistolet automatique, Ruby,* for the French and Italians.

After the war, Gabilondo y Urresti moved from Guernica to Elgolibar, close to Eibar, and changed their name to Gabilondo y Compañia. Until 1930, a variety of pistols patterned after the FN-Browning Model 1910 pistol were manufactured and marketed under the names *Ruby, Danton,* and *Bufalo* in calibers 6.35mm, 7.65mm, and 9mm Browning. From 1928 to 1933, Gabilondo manufactured a 7.65mm 22-shot pistol in semiautomatic and selective-fire versions, which was essentially an overgrown Ruby. This selective-fire model had a Star-type automatic sear trip and weighed over 1,000 grams. It was sold almost exclusively in China, but some were used by the Japanese air force.

In 1931, Gabilondo managers upgraded their product line and began work on a copy of the Colt-Browning Model 1911. The Ruby pistol illustrated here may have been a transitional

*There were originally two Gabilondo cousins associated with the company. When one of the two relatives left in 1909 the name became Gabilondo y Urresti.

FIGURE 13–31. Disassembled view of the 9mm Largo Star MD selective-fire pistol. ***(Krcma)***

model on the path to the Llama series. (Since there is some confusion surrounding the Gabilondo Llama model designations, see table 13–4 for information on the various designs.) The first model introduced in this series was an exact copy of the Model 1911 without a grip safety. It was chambered to fire the 9mm Largo and .38 ACP (9 × 23SR). For some unexplained reason, this gun was named the Llama Model IV. Shortly after its introduction, plain blowback 7.65mm and 9mm Corto pistols, which externally looked like the Model 1911, were introduced (1933). These Llama Models I and II were subsequently replaced by the Model III, which remained in production until 1954.

Gabilondo marked some of their pistols with the names of its distributors. Therefore, Llama pistols will often be found marked *Mugica* and *Tauler*. José Cruz Mugica, a shotgun maker in Eibar, distributed Llama models III, III-A, VII, VIII, X, X-A, and XI to Siam and elsewhere in Asia. Señor Tauler, a one-time captain in the national internal security forces, sold Llama pistols marked with his name to the Spanish police. The models he distributed included Models I through VII. Such a brief outline of Llama pistols as this should be taken as only a general guide. There are exceptions, and there are models yet to be classified. Production figures for the various Llama models are also not readily available.

Although the Spanish handgun industry was not as large as that of Belgium, Germany, or the United States, it was significant because of its exports and because of the coun-

FIGURE 13–32. A Gabilondo-made 7.65mm *Bufalo* pistol, which is essentially a copy of the Model 1910 Browning. *(Krcma)*

FIGURE 13–33. Prior to manufacturing the "Llama" pistols, Gabilondo y Compañia, Elgoibar, made the 7.65mm Browning caliber 22-shot *Plus Ultra* self-loader. The one shown here (serial number 16,222) is semiautomatic, but some selective-fire models were also built. *(Krcma)*

FIGURE 13–34. A Gabilondo y Compañia-made .45 ACP (11.43mm) *Ruby* automatic pistol, based on the Colt-Browning Model 1911 pistol. *(Krcma)*

TABLE 13-4 COMPARATIVE DATA FOR THE LLAMA SELF-LOADING PISTOLS

*Llama Model**	*Caliber*	*Type of Locking System*	*Production Dates*	*Remarks*
I	7.65mm	Plain blowback	1933–1936	No grip safety, solid backstrap
II	9mm Corto	Plain blowback	1933–1936	No grip safety, solid backstrap
III	9mm Corto	Colt-Browning	1935–1954	No grip safety, solid backstrap
III-A	9mm Corto	Colt-Browning	1954–	Grip safety
IV	9mm Largo	Colt-Browning	1931	No grip safety, solid backstrap
V	9mm Largo	Colt-Browning	1931–1940	No grip safety, solid backstrap
VI	9mm Corto	Colt-Browning	Uncertain	No grip safety, solid backstrap
VII	9mm Largo, .38 ACP	Colt-Browning	1932–1954	No grip safety, solid backstrap
VIII	9mm Largo, .38 ACP	Colt-Browning	1939–	Grip safety
IX	7.65mm, 9mm Para, .45 ACP	Colt-Browning	1936–1954	No grip safety, solid backstrap
IX-A	.45 ACP	Colt-Browning	1950–	Grip safety
X	7.65mm	Plain blowback	1935–1954	No grip safety, solid backstrap
X-A	7.65mm	Plain blowback	1950–	Grip safety
XI	9mm Para	Colt-Browning	1936–1954	No grip safety, solid backstrap

*All models subsequent to XI were manufactured after 1950.

tries to which its handguns were sold. After the civil war, the industry was much more rigorously controlled by the Franco government than it had ever been, and the drop in export sales put many of the smaller works out of business. Whereas Astra handguns had been used dominantly by the Spanish military before 1939, since that time Star pistols and submachine guns have seen the widest use in the Army and the Guardia Civil. Throughout this century, Spain has kept control of rifle manufacture in its own hands, but continues to allow Astra, Llama, and Star to produce handguns. For the Spanish, 1914 to 1936 were the golden years of handgun manufacture: a time when Guernica, Vitoria, Eibar, and Ruby were quite literally known around the world.

NOTES

1. B. Barceló Rubí, *El Armamento Portatil Español (1764–1939), una labor artilleria* (Madrid: Liberia Editorian San Martin, 1976), pp. 230–31; and James B. Stewart, "Military Automatic Pistols of Royal Spain," *Guns Illustrated, 1972* (Chicago: Follett Publishing Co., 1972), pp. 33–34.

2. Rubi, *El Armamento Portatil Espanol*, pp. 232–34; *Pistola Automática Sistema "Campo-Giro" con amortiguador del cho-*

FIGURE 13–35. Llama Model VIII in 9mm Parabellum. Most pistols of this model were made to fire 9mm Largo (.38 ACP). *(Tokol)*

FIGURE 13–36. A 9mm Largo caliber Llama pistol with the Tauler trademark, which was registered in Spain on 13 December 1933. This pistol corresponds roughly to the Llama Model VIII. *(Krcma)*

que retreceso, calibre 9mm. del Teniente Coronel de Estado Mayor, retirado D. Venacio López de Ceballos y Aguirre, Conde del Campo-Giro Declarada Reglamentaria por Real Orden de 5 d Enero de 1914 (Madrid: Imprenta de Eduardo Arías, 1914); José Rodriguez, *50th Anniversary—Astra: Unceta y Compañia, S.A.: 1908–1958—Biografia de una Empresa* (Guernica: Astra, 1958), pp. 12–15; and Letter from Inigo Diaz-Guardamino, director, Astra-Unceta to Edward C. Ezell, 13 Feb. 1979.

3. Rodriguez, *50th Anniversary*, p. 13.
4. O.O. file 13092/603, 18 Oct. 1906.
5. Pete Dickey, "Campo-Giro .45," *American Rifleman* (Dec. 1978): 64–65.
6. Rubí, *El Armamento Portatil Español*, p. 235.

FIGURE 13–37. The 9mm Parabellum Llama *Especial*, or Model XI. *(Krcma)*

7. Rodriguez, *50th Anniversary,* pp. 11–12, 15–18, 23; and Robert D. Whittington III, *German Pistols and Holsters, 1939/1945: Military, Police, NSDAP* (Dallas: Brownlee Books, 1969), pp. 91–97, 143–45, 212–15.

8. Thomas B. Nelson and Daniel D. Musgrave, *The World's Machine Pistols and Submachine Guns: Developments from 1964 to 1980,* vol. IIa (Alexandria, VA: T.B.N. Enterprises, 1980), p. 121.

9. Astra, Unceta y Compañia, "Pistolas Ametralladoras 'Astra,' Modelos 902 y 'F'," 12 April 1977; and Nelson and Musgrave, *The World's Machine Pistols and Submachine Guns,* pp. 106–13.

10. Gordon Thomas and Max Morgan Witts, *Guernica: The Crucible of World War II* (New York: Stein and Day Publisher, 1975), pp. 48–52, 191–93, 289.

11. Nelson and Musgrave, *The World's Machine Pistols and Submachine Guns,* pp. 237–53, 261–62; and Star-Bonifacio Echeverria SA, "Historia resumida de las Pistolas 'Star' con dispositivo ametrallador scncillo y con mecanismo retardador de la cadeacia de tiro," ca. 1977 (typescript).

14 CZECHOSLOVAKIAN HANDGUNS 1918 to 1939

Czechoslovakia declared its independence from the Austro-Hungarian Empire in October 1918. On 1 March 1919, the new republic established a state arsenal at Brno in Moravia under the name Československé Závody na Výrobu Zbraní (Czechoslovakian Factory for Arms Manufacture). Developed around former artillery repair shops, the arsenal was staffed by specialists who came to Czechoslovakia from Austrian arms factories in Vienna, Steyr, and Budapest. They brought with them drawings and technical data for the manufacture and inspection of the Mannlicher Model 1888/90 and Model 1895 rifles. This information made possible the early production of the Austrian Mannlicher Model 1895 at Brno.

The first work order received by the factory was for the reconditioning of 100,000 Mauser and Mannlicher rifles, which the Allied Powers had given the Czechoslovakian Republic from stocks of weapons formerly held by the defeated Central Powers. In 1921, the factory began the production of a small lot (5,500) of Mannlicher Model 1895 short rifles (*Stutzen*). Initial problems with its manufacture were solved through the assistance of technicians from the Österreichische Waffenfabrik-Gesellschaft in Steyr. Also in 1921, the Czechoslovakian government began negotiations with the Mauserwerke in Oberndorf for the right to produce the Mauser Model 98 rifle. At this time, the Brno factory made arrangements for the purchase of enough components to assemble 42,000 rifles. This arrangement with Mauser was subsequently cancelled for a number of reasons, but most significant was the desire of the Czechoslovakian Ministry of National Defense (*Ministerstvo národní obrany*) to produce the Mauser 98 in its entirety rather than only assemble it.

The Ministry's decision to produce the Mauser rifle in Brno had important consequences for pistol production, as well. All of the machine tools used to manufacture the Mauser 98 were purchased from Mauser, who sent a team of technicians to supervise the installation of the machinery and to start production. The German team was headed by Josef Nickl, a production engineer who also designed pistols. Before examining Nickl's pistols, which served as the basis for the first Czech service handgun, a brief review of the potpourri of small arms in the Republic's inventory would be helpful.

Immediately following the successful break from the Austro-Hungarian Empire, the Czechoslovakian government acquired arms from many sources. One Czech historian has commented, "The net result was a rich collection of weapons rather than standard high quality equipment."[1] In 1921, 92 different models of weapons were in the army's possession, with small caliber pieces making up the largest number of different types. Table 14–1 shows the basic small arms in service.

The basic long-term goal of the post-1919 Czechoslovakian rearmament program was the reduction of weapon types and the standardization of as few different weapons as

TABLE 14-1 SMALL ARMS IN SERVICE IN CZECHOSLOVAKIA, 1921

Handguns:	Austrian Modell 1898 Rast & Gasser revolver
	German M1888 Reichsrevolver
	Russian M1895 Nagant revolver
	French 1892 Modèle d'Ordonnance revolver
	Spanish Garate, Anitua revolver
	Austrian Repetierpistole Modell 07 (Roth-Steyr) automatic pistol
	Austrian Repetierpistole Modell 12 (Steyr-Hahn) automatic pistol
	Hungarian Pisztoly 12m (Frommer Stop) automatic pistol
Rifles:	Austrian Repetier-Gewehr Modell 1895 (Mannlicher) in its various models, including carbines
	German Infanteriegewehr Modell 1898 (Mauser) in its various models
	Russian Model 1891 Mosin Nagant rifle
	Japanese Type 38 Arisaka rifle
	Italian Modello 91 (Carcano) rifle
	French Modèle 1886 (Lebel) rifle
	French Modèle 1907/15 rifle
Machine guns:	Austrian Maschinengewehr (Schwarzlose) Modell 07, 07/12, and 07/16
	German Maschinengewehr (Maxim) Modell 1908 and Modell 1908/15
	French Mitrailleuse (Hotchkiss) Modèle 14
	French Fusil Mitrailleur (Chauchat) Modèle 15
	British M1915 Vickers gun
	British Lewis gun

possible. Since standardization would take several years to accomplish—funds for defense procurement were in short supply—defense officials decided to equip those units with similar roles with the same small arms.

Handguns posed special problems. Because there were eight basic models and a handful of other types in their possession, National Defense Ministry authorities decided that a standard Czechoslovakian-made self-loading pistol should be the first totally new weapon adopted and manufactured for the Czech armed forces.

The first self-loading Czech handgun made specifically for military purposes was developed at the Brno factory from a design Josef Nickl had experimented with at the Mauserwerke. Nickl worked on his handgun designs during the 1914 to 1918 war, but information about his activities is very scarce. According to a widely circulated story, his work did not impress the Mauser management, but he was free to proceed with his designs because he had political influence. An equally plausible explanation for Mauser's disinterest was the negative effect of the war on new proposals for weapons. Whatever the truth, Nickl was anxious to see his handguns manufactured when he went to the Brno factory.

Nickl's design basically married a rotating barrel locking system to the Mauser Model 1910/14 pocket-type pistol. When this pistol was fired, the barrel and slide recoiled together until a cam on the barrel engaged a camming piece in the frame. Once the barrel met that cam, the barrel turned and unlocked from the slide. The barrel stopped, but the slide continued its travel to the rear. This system of operation was essentially the same as for the Austrian Repetierpistole Modell 12 (Steyr-Hahn). Whereas the Mauser-Nickl pistols were chambered to fire the 9mm Parabellum cartridge (9 × 19mm), the first Czechoslovakian pistol of the Nickl-type fired the 9 × 17mm (.380 ACP) cartridge.

In 1920, the Permanent Testing Commission for the Equipment and Armament of the Infantry (*Dočasně stálá zkušební komise pro výstroj a výzbroj pěchoty*) conducted tests at the Orechovice test center. Three models were submitted for trial: a 7.65mm Browning design by Vaclav Holek

TABLE 14-2 EQUIPPING CZECH UNITS WITH SMALL ARMS, 1921

Units	*Weapons*
Infantry, cavalry, artillery engineers, and rear protection battalions	**Mannlicher rifles and carbines**
Armored car personnel, air force, telegraph regiments, railroad and armored train regiments, motorized infantry, armored truck units, and military police	**Mauser 98 rifles and carbines**
Infantry and cavalry	**Schwarzlose machine guns**
Special units assigned to protect airports and facilities of importance in Slovakia and the Carpathian Ukraine	**Maxim machine guns**
Cavalry	**FM15 Chauchat**
Air force	**Vickers and Lewis guns**

of Praga Zbrojovka in Vrsovice; a 9mm Browning by Alois Tomiška of Škoda in Plzeň; and a 9mm Parabellum handgun by Josef Nickl of the Čeckoslovenské factory in Brno. As a result of the trial, the commission proposed that ten more 9mm Parabellum and ten smaller 9mm Browning models be built and that further tests be conducted by the Brno factory. The Ministry of National Defense authorized the purchase of these pistols a few days later.

At this point, matters became complicated. In December 1919 (before the trials), the ministry ordered 10,000 7.65mm pistols from the Škoda factory. The following June, the management at Škoda told defense officials that they could not deliver the handguns because the order did not "fit into their production line." Praga Zbrojovka, another small arms company, was hungry for such a contract, however. A. Nowotný, backed by the Czech Industrial Bank, established the Praga

FIGURE 14–1. Josef Nickl's experimental 9mm Parabellum rotating-barrel, self-loading pistol made at Mauser, ca. 1916. This pistol, serial number 22, is approximately 170mm in length, with a 104 mm barrel. Note the retraction grip pieces, which are quite similar to the Mauser 1914 pocket pistols. Also note the letter *N* next to the takedown catch. Side-plate markings: Mauser banner; "Mauser-Werke A.G.; Oberndorf a.N." ***(Visser)***

FIGURE 14–2. Josef Nickl's experimental 9mm Parabellum pistol, serial number 29. This Mauser was the progenitor for the Czeckoslovakian vz.22 and vz.24 pistols. Note the retraction cuts on the slide, which are quite similar to those used on the Czech-made weapons. Overall length is approximately 170 mm, with a 104 mm barrel. Side-plate markings: Mauser banner; "Waffenfabrik Mauser A.G.; Oberndorf a.N." ***(Visser)***

FIGURE 14–3. This 7.65mm Browning Praga automatic pistol was adopted by the Czechoslovakian armed forces as an interim "emergency" weapon. It is basically a 1910 Browning in design with no grip safety, a separate breech block, and no barrel bushing (the recoil spring is retained by the inside of the slide). The barrel protrudes about 6.35mm. These weapons had a very poor reputation for reliability. *(Krcma)*

Specifications	English	Metric
Caliber	.32 ACP	7.65 × 17mm Browning
Overall length	6.57 in.	167mm
Empty weight	20.6 oz.	585 g
Barrel length	3.78 in.	96mm
Rifling twist	4-right	
Method of operation	Blowback	
Method of locking	Browning	
Feed device, capacity	7-shot box magazine	

Small Arms Company in 1918 in a factory built during the war in Vrsovice. With the installation of wartime tooling and machinery completed in October 1918, the new company needed the government contract it received in July 1920 for 5,000 Praga pistols. Delivery of these pistols, which were derivatives of the 1910 FN Browning, began the following December.

Meanwhile, in November 1920, the Brno factory had delivered the Nickl prototypes. Viewed as "absolutely inadequate," the pistols were returned to the manufacturer by the Test Commission for modification. Results of June 1921 tests were more satisfying, and the commission proposed an order for 1,000 pistols of this 9mm Parabellum pattern for extended trial. While their recommendation was approved by defense authorities, it ran into significant opposition at the Ministry of Finance, where officials questioned the Nickl's much higher cost when compared to the Praga. Why couldn't the army procure the cheaper Praga rather than this new design? Extended discussions continued until September 1921.

As Praga pistol deliveries were very slow and progress with developing the Nickl design was delayed, frustrations within defense circles mounted. In October 1921, the Technical Armament Department at the Ministry of National Defense took a definitive stand: the Praga pistols would only be used in the event of "extreme emergency" and would not be introduced into the inventory of the Czechoslovakian army. The army would carry the Nickl. It was November 1921 before the government accepted 4,600 of the Praga pistols it had ordered in the summer of 1920. The handguns were already obsolete and more costly than expected.

Some Praga pistols did find their way into the hands of Army personnel, and there was great unhappiness with them. In 1924, the firm had to repair over 400 pistols at its own expense. Although the Praga company made a commercial version of its pistol for several years, the technical and financial problems of the firm continued to grow. After a short, troubled existence, Praga Zbrojovka went out of business in 1926.

The first production 9mm Parabellum Nickl-Brno pistols were accepted by the government in October 1921. A total of 2,700 went to the militia, but it was some time before the army was able to procure the Czech-made handgun in the quantities it needed. In the meantime, the army continued to purchase handguns from abroad through Hubertus, an export firm. A total of 7,600 Ortgies and Dreyse pistols were bought from Germany in 1921 and 1922, but the Dreyse weapons were withdrawn from service in 1923 because of unspecified accidents with them.

Early in February 1922, the Čeckoslovenské factory in Brno proposed two new versions of the basic Nickl design. Both pistols were designed to fire the Czech vz.22 9mm pistol cartridge (*čs. pistolvý náboj 9mm vz.22*), a version of the 9mm Browning (.380 ACP). In March, the Technical Armament Department sent a list of desired changes to Brno, which included a strengthened barrel and slide and a modified extractor, sight, firing pin, and hammer. The technical personnel wanted the slide, which was held open after the last shot was fired, to close when the magazine was removed. Previously, it had closed when a loaded magazine was inserted into the gun.

On 20 April 1922, a contract for 19,000 Nickl pistols was approved. Based on the government's recommendation, this pistol was officially designated *Armádní Pistole vz.22* (army pistol model 1922) on 19 July 1922. Problems encountered during pistol tests with the Model 1922 9mm ammunition delayed production of the pistol, but experiments with the

FIGURE 14–4. Disassembled view of the Praga 7.65mm pistol. Note the separate breech block to the left of the recoil spring. *(Krcma)*

prototype vz.22 pistols continued throughout 1922 and into 1923. By that time, the Brno factory, now called Československé Zbrojovka/Akciová Spolecnost (Czechoslovakian Arms Factory Ltd.), was fully occupied with preparations to produce their version of the Model 98 Mauser rifle (Model 98/22). As a result, the management at Brno told the Ministry of National Defense that it would not be possible to fabricate both rifles and pistols in their shops.

Looking around, the Ministry discovered that Jihočeská Zbrojovka s.s.r.o. (South Bohemian Arms Factory Ltd.) in Strakonice was interested in expanding its production. Officials asked the company to submit a bid for the manufacture of 20,000 vz.22 pistols per year with a possible total order of 100,000 pistols over a five-year period. Jihočeská Zbrojovka had been established in 1919 by architect Karel Bubla with the financial backing of several wealthy individuals who were associated with the Škoda works. Before construction of the factory at Strakonice was completed, the company had begun production of the 6.35mm Fox automatic pistol at Plzeň. About twenty workers and four clerks working under the direction of Alois Tomiška, the designer of the pistol, made the pistols by hand until 1920 when production tooling of the type planned for the Strakonice facility was installed. In April 1921, before the buildings were completely finished, production was shifted to Strakonice. An engineer by the name of Bartsch was appointed technical director, while Tomiška was placed in charge of design and product improvement.

Since they had expanded their organization in 1922 when they acquired another factory from Hubertus, Jihočeská Zbrojovka managers wanted a guarantee for five years of work. This was not met with great enthusiasm by the government, and negotiations continued for more than six months. The first order was finally issued in December 1923 for 20,000 pistols, with a down payment of one-third of the total value sealing the bargain. At some point during the negotiations, the Jihočeská Azrojovka name was changed to Česká Zbrojovka. The company's initials, "CZ," would become a world famous trademark in the late 1920s and throughout the 1930s.

Existence of an offical order did not guarantee production, however. Technical problems remained to be resolved;

agreements between the factories at Brno and Strakonice had to be written; the Mauser license had to be finalized; and the production line had to be set up. Five years after the requirement for domestic pistol production had been established, a suitable production program still eluded government planners. The Brno factory had continued to produce the vz.22 in small quantities with 18,000 weapons having been made. Continued demand for immediate delivery of handguns to the military led to a December 1923 order for 6,510 additional Ortgies 7.65mm pistols, with 5,000 more ordered in April 1924.

During January and February 1924, the Permanent Test Commission evaluated and then approved a modified vz.22 pistol that had been worked by the design staff at Brno. František Myška and his associates at Česká Zbrojovka then prepared to produce the modified gun, a process that took nearly a year. Because of its internal differences as compared with the original vz.22 and because it was to be manufactured at a new factory, the modified handgun was designated the vz.24. Table 14–3 compares the vz.22 and the vz.24. Many of the external differences between them reflect Myška's work to simplify the manufacture of the Nickl design and to tailor the pistol to the machine tools available for its fabrication.

TABLE 14-3 COMPARISON OF VZ.22 AND VZ.24

	vz.22	vz .24
Barrel	Muzzle flush with slide	Muzzle protrudes slightly beyond slide
Ejection port	Straight edge at rear	Rounded at rear
Side plate on left	Flat	Ridged
Trigger	Open space between trigger and frame	No space
Location of manufacturer's markings	On side plate	On top of slide

In January 1925, the Permanent Test Commission established a requirement that the Strakonice factory manufacture 3,000 pistols per month with a single shift of workers. By August 1925, the first 200 Strakonice-made vz.24 handguns were ready for acceptance testing. Reporting at the end of

FIGURE 14–5. Czechoslovakian vz.22 service pistol, caliber 9mm Browning. Side-plate markings: "9.mm. N; Cs.st.zbrojovka, Brno" ("Czechoslovakian State Arms Factory, Brno"). Note that this pistol has an external hammer, a feature not present on the Nickl-Mauser pistols. *(Fabrique Nationale)*

Specifications	English	Metric
Caliber	.380 ACP	9mm Browning
Overall length	6 in.	152.4mm
Empty weight	21.92 oz.	621 g
Barrel length	3.44 in.	87.38mm
Rifling twist	6-right	
Method of operation	Recoil	
Method of locking	Nickl rotating barrel	
Feed device, capacity	8-shot box magazine	

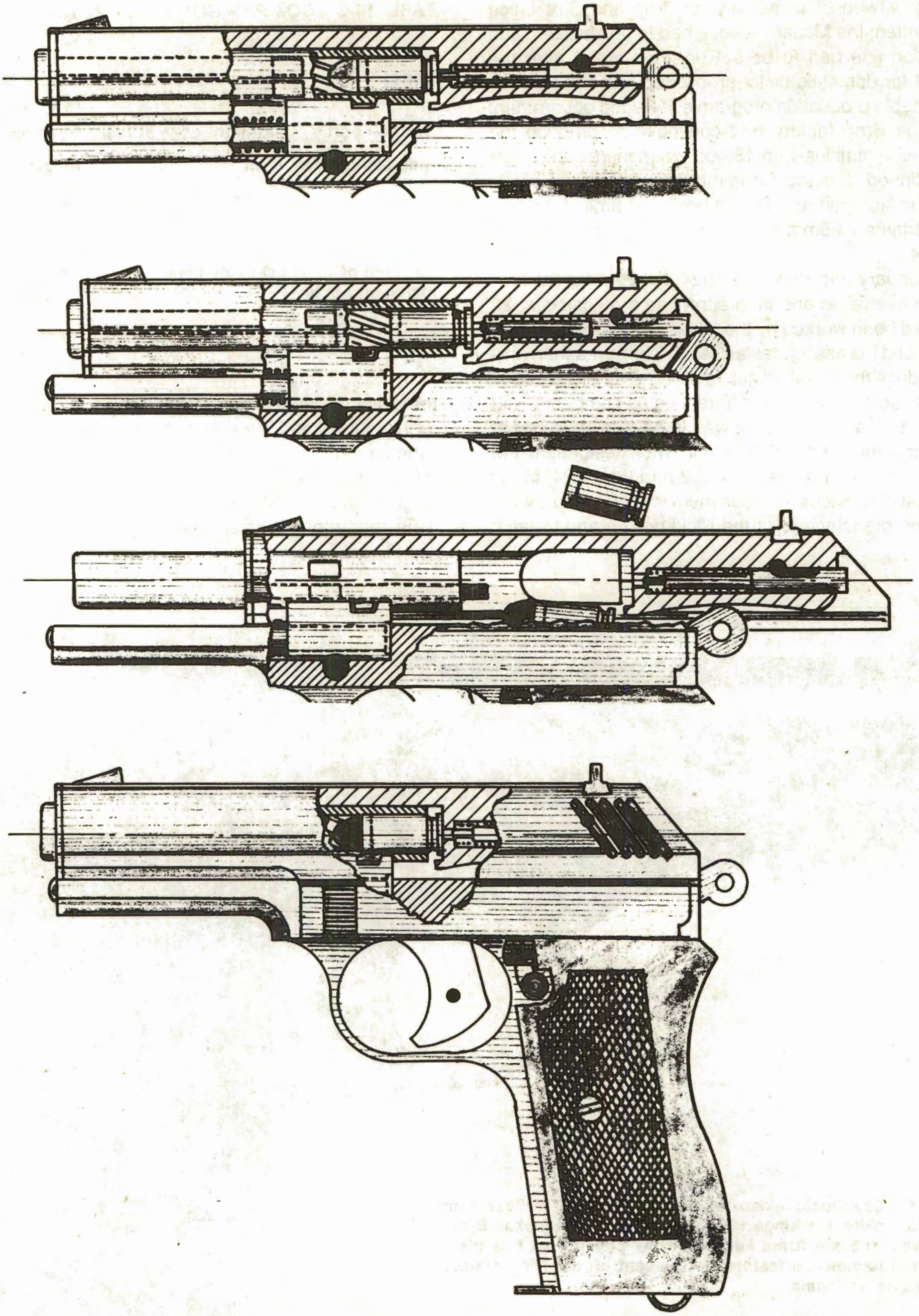


FIGURE 14–6. Operation of the vz.22 and vz.24 locking system. The barrel and the slide are rigidly locked by two rectangular lugs on either side of the barrel, engaging in the side walls of the slide. A helical-portion camming lug on the barrel underside rides in a corresponding helical groove in a rigidly pinned block on the upper surface of the frame. When the weapon is fired, the barrel is rotating through 22 degrees, causing disengagement of the side lugs, and thus permitting further recoil of the slide. *(Simmons)*

FIGURE 14–7. Czechoslovakian vz.24 9mm Browning caliber pistol, serial number 34805. The manufacturer's name appears on top of the slide: "Česká Zbrojovka A.S. v Praze." ***(Krcma)***

Specifications	English	Metric
Caliber	.380 ACP	9 × 17mm Browning
Overall length	6.26 in.	159mm
Empty weight	23.26 oz.	659.5 g
Barrel length	3.54 in.	90mm
Rifling twist	6-right	
Method of operation	Recoil	
Method of locking	Nickl rotating barrel	
Feed device, capacity	8-shot box magazine	

TABLE 14-4 CZECH HANDGUN CONTRACTS, 1922–1936

Model	*Year*	*Quantity*
vz.22	1922–1925	18,000 (Brno)
vz.24	1925–1931	100,000 (Strakonice)
vz.24	1935	1,400 (Strakonice)
vz.24	1936 (delivered 1936–1938)	70,000 (Strakonice)

August, the commission was full of praise for the weapon. The group's secretary noted: "I consider this weapon, after removal of the defects which were found, to be fully adequate for its purpose, combat at close range."

Although handguns were being delivered at an acceptable rate, they were still late according to the original projections. The 20,000 pistols ordered for delivery by December 1924 were finally in the army's hands by June 1926. The initial 100,000 scheduled for delivery during the five-year period from 1924 to 1928 were delivered between August 1925 and December 1931. Subsequent orders from the Ministry of National Defense were awarded as shown in table 14–4. The prices fluctuated over the years, but in the government's favor.

Česká Zbrojovka received the assistance of numerous subcontractors. Parts purchased included magazines from K. Schulz in Komorany near Prague and Hornsteiner in Prague; magazine springs and followers from the Škoda factory in Plzeň; forgings for the frames from Škoda and Poldi Metallurgical Works in Kladno; steel from Poldi Metallurgical Works; steel for the magazines from Vítkovice Steel Works; and pistol grips in walnut from Československé Zbrojovka in Brno and in plastic from Česká Zbrojovka in Strakonice. Some chemicals and special tools were purchased abroad, primarily from Germany. For example, drills were bought from Franz Stock, a handgun and machine tool manufacturer in Berlin. But since the government was stressing self-sufficiency, the factory tried to purchase materials in Czechoslovakia.

To keep the production line in operation, Česká Zbrojovka sold the vz.24 abroad and manufactured several commercial models. Export sales of the vz.24 were to Lithuania (several hundred) in 1929, 1930, and 1934 and to Poland (1,700) in 1929 and 1930.

Although excellent in its quality of manufacture, the vz.24 pistol was not without its faults. Primary among these was

TABLE 14-5 HANDGUN COSTS, 1923–1936

Model	*Year*	*Cost in Crowns per Weapon**
vz.22	1923	560 [proposed cost] ($16.55)
vz.24	1926	560 ($16.60)
vz.24	1928–1930	540 to 545 ($15.90 to 16.00)
vz.24	1936	320 ($12.80)

*U.S. dollar conversions based on contemporary rates of exchange.

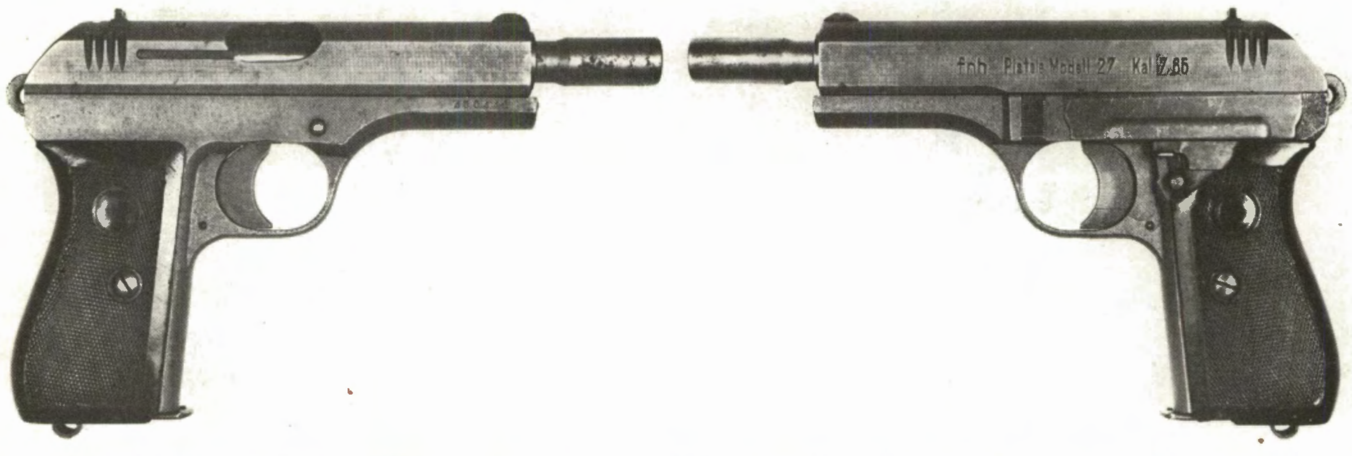


FIGURE 14–8. German-era (1939–1945) manufactured vz.27 in 7.65mm Browning. This pistol, serial number 450441, is equipped with a special barrel to permit the attachment of a silencer. The slide markings, "fnh Pistole Modell 27 Kal. 7.65," are typical of German era vz.27 pistols; "fnh" was the German letter code for Česká Zbrojovka, Strakonice. Note that "CZ" has been eliminated from the grip plates. Typical markings on top of the slide for this pistol are: "Ceska Zbrojovka A.S. Praze 143195," early occupation; "Bömmische Waffenfabrik A.G. Prague 168939," before June 1941; and blank with "fnh" on side of slide, after June 1941. *(Krcma)*

Specifications	English	Metric
Caliber	.32 ACP	7.65 × 17mm Browning
Overall length	6.38 in.	162mm
Empty weight	25 oz.	709 g
Barrel length	3.89 in.	99mm
Rifling twist	6-right	
Method of operation	Blowback	
Method of locking	Browning	
Feed device, capacity	9-shot box magazine	

FIGURE 14–9. Post-1948 manufactured vz.27 automatic pistol. *(Krcma)*

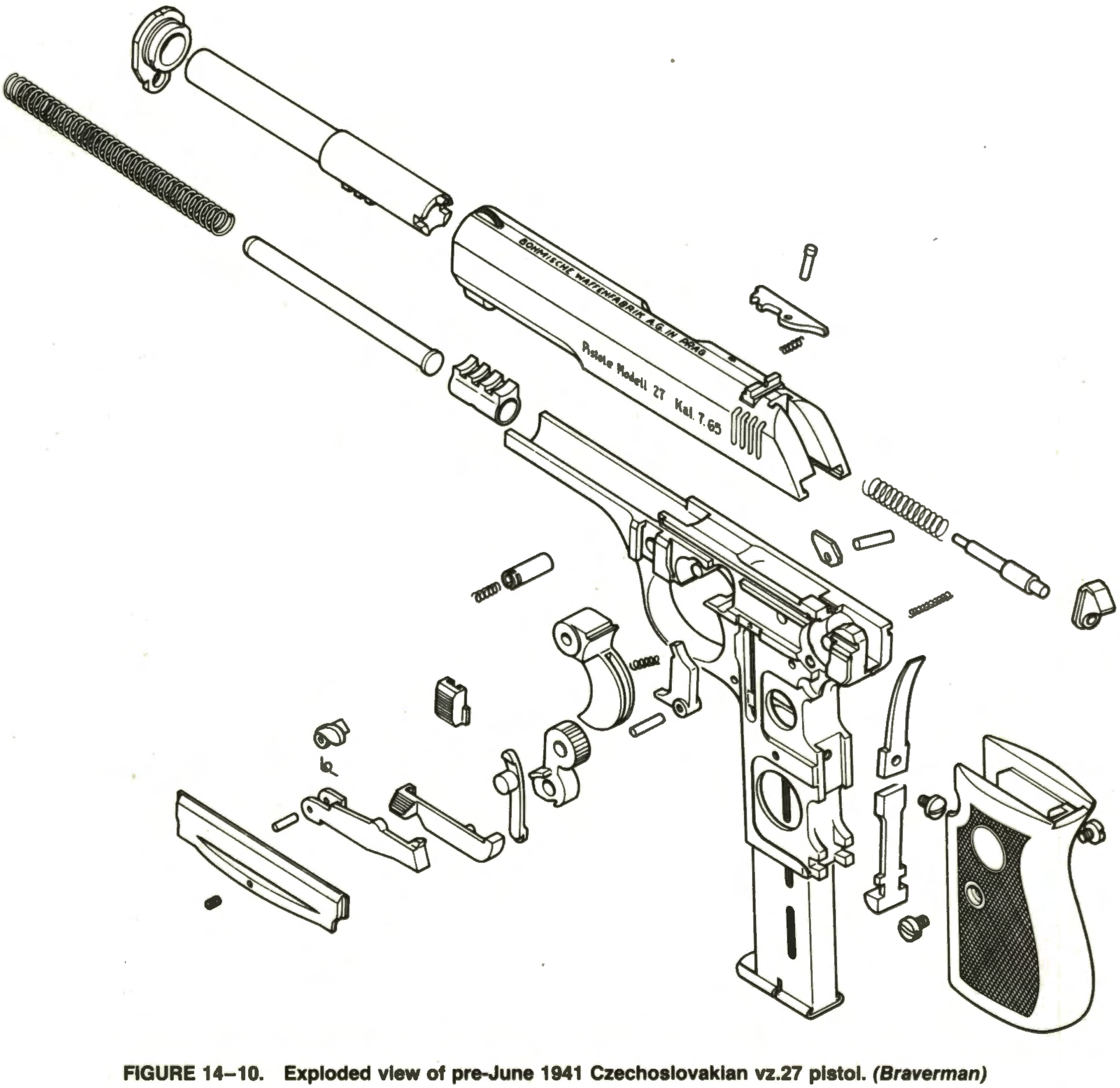


FIGURE 14–10. Exploded view of pre-June 1941 Czechoslovakian vz.27 pistol. *(Braverman)*

its locking mechanism. The rotary locking barrel was essential as long as the weapon fired the 9mm Parabellum cartridge. When it was scaled down to fire the 9mm Browning round, the locking system was a needless complication. František Myška fully appreciated this and, shortly after joining Česká Zbrojovka, developed a simple blowback version of the vz.24 in 7.65mm Browning. As issued to police and security guards, this simplified handgun was designated the vz.27 (CZ 27 in the commercial version). During its period of manufacture, 1927 to 1951, more than half a million were made. During the Second World War (1939 to 1945), the German government operated the Česká Zbrojovka factory under the name Böhmische Waffenfabrik AG in Prag (Bohemian Weapon Factory Ltd. in Prague). After the 1948 revolution in Czechoslovakia, the company's name was changed to Česká Zbrojovka Národni Podnik (Bohemian Arms Factory People's Enterprise). It continued as a state-owned enterprise.

In April 1936, officials of the Military Technical Aviation Institute (*Vojenského techického letechéko ustavu*) contacted the Ministry of National Defense requesting the development of a simpler, more reliable pistol than the vz.22–vz.24. An Aviation Institute report stated that the "vz. 24/22 pistol has several defects which do not inspire confidence in it." Problems associated with the gun discharging when the barrel was not completely locked, extraction difficulties, the possibility of losing small parts, and its extreme sensitivity to dirt all spoke against this handgun. To obtain a satisfactory replacement, the Aviation Institute asked Česká Zbrojovka to create the simplest blowback self-cocking pistol possible for the vz.22 9mm (Browning) cartridge. František Myška headed the design team that created this new handgun.

A test lot of 25 pistols, delivered to the Military Technical Aviation Institute in January 1938, received immediate complaints about the reduced accuracy of the self-cocking trigger. These first samples had especially long and hard trigger pulls; otherwise, the new pistol received good marks. Although the institute wanted immediate adoption of the new handgun as the vz.37, the Test Commission decided to study the matter further. On 30 April 1938 the body approved the weapon and gave it the designation vz.38 (Czechoslovakian patent number 65558).

Česká Zbrojovka received an order for 41,000 of these new service pistols on 14 June 1938. The negotiated production price was 270 crowns ($9.35), which was 50 crowns less than the lowest price paid for the vz.24. Unfortunately, not a single vz.38 was delivered to the army before the Germans occupied the country. On 1 October 1938, the German government annexed the Sudetenland, and by the following March the remainder of the country had fallen to Nazi domination. Apparently very few of the vz.38 handguns were manufactured for the Germans either, who designated it the *Pistole 39(t)*, with the *(t)* standing for Tschechoslowakei. Reported serial numbers for the vz.38 range between 250,000 and 290,000, which has led to the hypothesis that production model serialization began with 250,000. Once the Germans

FIGURE 14–11. This pistol is believed to be a prototype or very early production model of the vz.38. It has the serial number 250011, which may mean it was the eleventh prototype or the eleventh serial production gun. The manufacturer's legend, "Česká Zbrojovka A.A. v Praze," is on the side plate, as is most common. *(Sotamuseo)*

FIGURE 14–12. The 9mm Browning caliber vz.38 service pistol. Production of this double-action pistol, which was designed by František Myška, was terminated by the Nazis after they occupied Czechoslovakia. Slide markings read "Česká Zbrojovka AKC. SPOL. v Praze," with the serial number 261614. The low-set hammer can be lowered to half-cock from cocked position. *(Krcma)*

discontinued the manufacture of the vz.38, it was not resumed.

For twenty years before the German occupation, Česká Zbrojovka managers had worked hard to keep the firm financially solvent. In 1922 before their first government contract, the company (then called Jihočeská Zbrojovka) was concentrating on manufacturing handguns by the most modern—and most expensive—processes. As a result, the firm demonstrated a financial loss at first—3 million crowns in 1922 and another 3 million crowns in 1923—which led to the 1923 reorganization and a new name, Česká Zbrojovka. Their 1923 army contract for the vz.22 pistol allowed the company to make a profit for the first time in 1925. In the late 1920s, the growing impact of worldwide depression forced the firm's directors to maintain pressure on army officials for government projects and search for ways to diversify their products. The "CZ" trademark began to appear on machine tools, bicycles (1923), and motorcycles (1924), following a pattern established by Fabrique Nationale, Mauser, and several American arms makers who had expanded their product lines at various times to get through periods of economic uncertainty. Between 1931 and 1935 when Česká Zbrojovka did not have contracts for the vz.24, there were major layoffs of factory workers.

By 1939, Česká Zbrojovka was the primary handgun manufacturer in Czechoslovakia. Although Československé Zbro-

FIGURE 14–13. Fieldstripped view of the vz.38 service pistol. *(Krcma)*

Specifications	English	Metric
Caliber	.380 ACP	9 × 17mm Browning
Overall length	7.8 in.	198mm
Empty weight	32.49 oz.	921 g
Barrel length	4.72 in.	120mm
Rifling twist	6-right	
Method of operation	Blowback	
Method of locking	Simple blowback; barrel hinged at front and attached to frame.	
Feed device, capacity	9-shot box magazine	

FIGURE 14–14. A special version of the vz.38 pistol. Note the addition of a manual safety. This pistol may have been manufactured for the Bulgarian government. *(Krcma)*

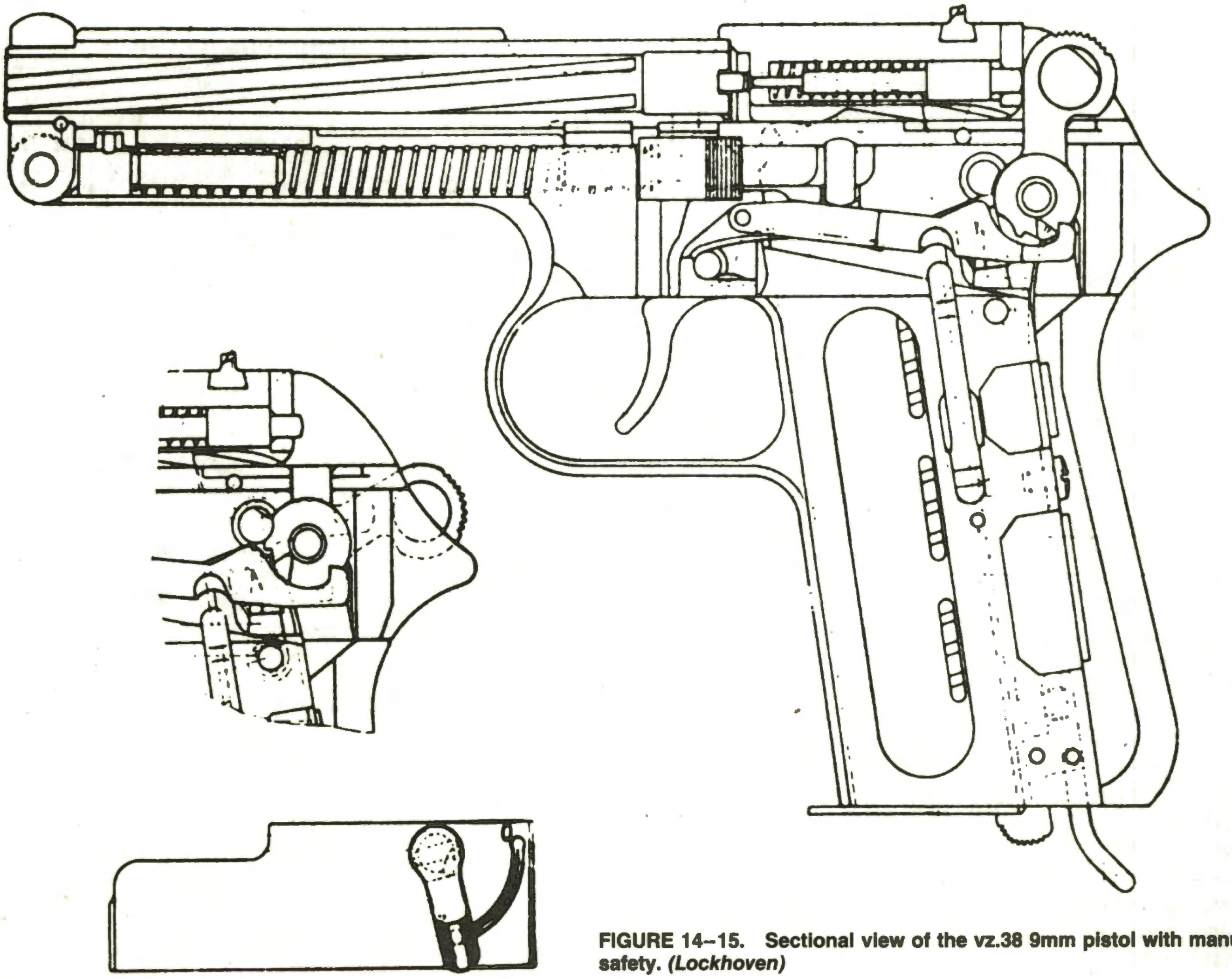


FIGURE 14–15. Sectional view of the vz.38 9mm pistol with manual safety. *(Lockhoven)*

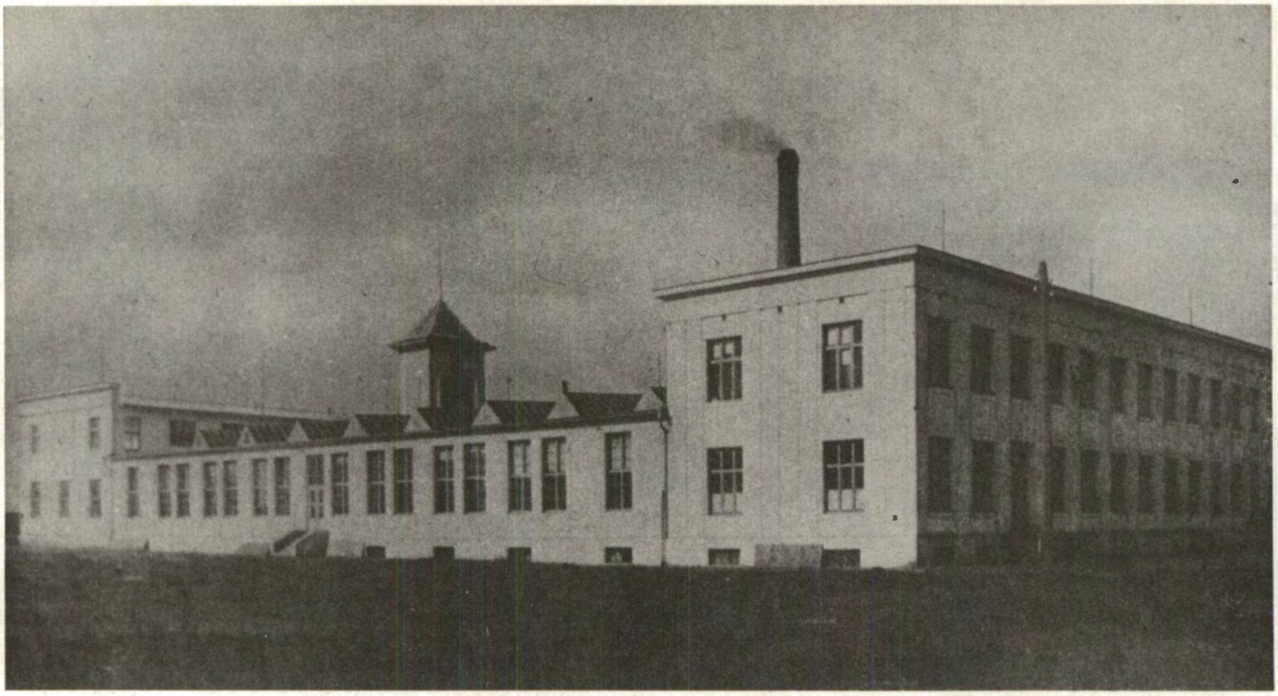


FIGURE 14–16. The main Česká Zbrojovka production building at Strakonice in the mid-1930s. *(National Defense)*

jovka's net worth was 24 times that of Česká Zbrojovka, the firm was an important one in the defense industry of Czechoslovakia. At World War II's start, they had made more than 183,000 vz.24 pistols, a combined total of 25,000 vz.28 and vz.30 flare pistols, and a small number of vz.28 and vz.30 aircraft machine guns. In addition, Česká Zbrojovka also made bayonet scabbards, reengineered the Lewis and Vickers machine guns to 7.92mm for aircraft use and produced the necessary parts for the conversions, and supervised the research and development of submachine guns and self-loading rifles.

None of the Czechoslovakian firms could have, or likely would have, undertaken the manufacture of small arms without the support of the government. Historian Miroslav Sada noted that the foundation for the manufacture of basic weapons was built at the cost of acquiring licenses (foreign and domestic), purchasing machine tools at home and abroad, and receiving the finished products far behind schedule.[2] Orders from the government, of course, were the basic insurance for the successful development of armament plants. To build the 100,000 vz.24 pistols at Česká Zbrojovka, the state had to make an investment of 10 million crowns (nearly $300,000) for production equipment. A license fee of 6.75 crowns per pistol was paid to Mauser, for a total of 1,363,500 crowns (about $45,000) for the approximately 202,000 vz.22 and vz.24 pistols manufactured between 1922 and 1938.

Was the pistol production effort worth the time and money spent? In Sada's view, "the balance sheet of our armament production program had its light and dark sides."[3] In the plus column of the national ledger, the army had excellent small arms, even though they cost billions of crowns. The armament firms became pioneers in modern production techniques, and as such they played a significant role in creating a national technology base and in building the economy. But on the negative side, Česká Zbrojovka was forced to produce large

TABLE 14-6 SUMMARY OF CZECHOSLOVAKIAN MILITARY HANDGUNS, 1920–1946

Model	*Total Manufactured*	*Date*
Praga 7.65mm	ca. 10,000	1920–21
CZ vz.22 9mm	18,000	1922–25
CZ vz.24 9mm	ca. 172,000	1925–38
CZ vz.27 7.65mm	ca. 183,000	1927–39
CZ vz.27 7.65mm	ca. 470,000–475,000	1940–45
CZ vz.27 7.65mm	ca. 45,000	1945–46
CZ vz.38 9mm	ca. 10,000–12,000	1938–39
Total	ca. 908,000–915,000	

quantities of equipment for the German armed forces during World War II. In addition to the vz.27 pistol, Česká Zbrojovka produced components for the P-38 pistol and for the MG-34 and MG-42 light machine guns, machine-gun belt links, light cannons, and aerial bombs. However, many workers at the factory engaged in smuggling weapons out of the plant and in sabotage. At the end of the war, the factory renewed production for the Czechoslovakian government and from 1945 to 1946 made 45,000 vz.27 pistols and 11,000 6.35mm handguns. In 1946, the firm also assembled a small lot of 9mm vz.24 pistols from prewar parts for the army. Workers at the Česká Zbrojovka factory made spare parts for the vz.24 and vz.27 pistols, as well, and assembled 3,000 P-38s from components fabricated in the town of Hradek for Spreewerk.

In the post-1945 era, Česká Zbrojovka has continued to dominate the Czechoslovakian military handgun scene. The 7.65mm Browning vz.50, the 7.62 × 25mm vz.52, and the 9mm Parabellum vz.75 pistols have all been products of the factory.

NOTES

1. Miroslav Sada, *Československé Ruční Plané Zbraně a Kulomety* (Prague: Nase Vojsko, 1971), p. 11.

2. Ibid., p. 32.

3. Ibid., p. 38.

Other significant sources include:
Boothroyd, Geoffrey. *The Handgun.* New York: Bonanza Books, 1970, pp. 474–78.

Hogg, Ian V., and John Weeks. *Pistols of the World.* London: Arms and Armour Press, 1978, pp. 49–53.

Mathews, J. Howard. *Firearms Identification.* Vol. 1. Springfield, IL: Charles C. Thomas Publisher, 1962, pp. 183–90.

Vojta, Jiri T. "The History of Czechoslovak Military Pistols," *Fusilier* (Spring, 1974): 17–19, 53; (Summer 1974): 20–23.

15 Finnish Handguns 1918 to 1944

Finland's armed forces can trace their heritage to a period of Russian rule that began after the defeat of the Swedes in the Russo-Swedish War of 1808–1809. After the Russian victory, Finland, which had been part of Sweden, became an autonomous duchy under the personal rule of Russia's Tsar Aleksandr I (1777–1825). Although there were occasional periods of stress during the 1800s, friction between the Russians and the Finns, with their tradition of Swedish law and their own distinctive language, was minor until Russian officials under Tsar Nicholas II (1868–1918) tried to reduce Finnish autonomy, forcing Russian policies, culture, and language on the Finns. As the Russian yoke grew tighter, Finnish revolutionaries grew bolder, and in 1904 the Russian governor general of Finland was assassinated.

Just how this movement for freedom would have gone without the start of the First World War is not clear, but the war certainly served as a catalyst. Instead of trying to recruit the Finns as allies in a world conflict, the Russians forced them to support an Imperial war against the Central Powers. As a result of increasing repression, Finns of nearly every political persuasion hoped for the defeat of the Russians by Germany, and some worked actively for that defeat.

By the time of the Russian Revolution in February 1917, the Finnish population had become divided into roughly two political camps over the Russian question. The nationalists on the left were sympathetic to the proletarian elements of the revolution, while the more bourgeois Finns (center and right politically) wanted a different kind of future for their country. Both camps agreed that Finland should be independent, but their visions of freedom varied. Taking advantage of the chaotic situation following the Bolsheviks' rise to power in October 1917, Finland declared itself independent of Russia on 6 December. But this written declaration did not stop 30,000 Finnish Red Guards from seizing Helsinki's railroad station the next month and clashing with the more conservative White Finnish Defense Corps (Suojeluskuntajärjestö). The Bolshevik-backed Finns proclaimed an insurrection and stormed the capital, but the Defense Corps disarmed the Red forces elsewhere in Finland and moved quickly to establish control over five-sixths of the land and half the population. The Red Guards held Helsinki and much of the industrialized south, which they proclaimed to be a Socialist Workers' Republic. The scene was thus set for a civil war fight between the Reds and Whites in Suomi,* backed by their respective groups in Russia.

The White Army, consisting largely of rural Finns, was led by former Tsarist General Carl Gustaf Emil Mannerheim (1867–1951). A Swedish corps of volunteers and a special force of Jägers, Finnish soldiers and officers who got their basic military training from Germans who had fought in the Latvian campaigns againt the Russians (World War I), filled out the ranks. Mannerheim launched an all-out drive against the Red Guards, now 60,000- to 70,000-strong, in March 1918, capturing the Red's stronghold in Tampere, a major industrial city in south central Finland. With assistance from the Germans at Helsinki in April, Mannerheim's forces were able to conclude the war by mid-May. But victory over the Red Guards did not solve Finland's problems. The anti-Soviet stance taken by the young government would complicate relations with their gigantic neighbor for many years to come.

With the strongly armed Russians sharing a long, isolated border, the creation of a domestic defense industry and the rationalization of its military equipment was a primary concern for Finland's military leaders. As might be expected, most of the equipment used by the Finnish Defense Forces was Russian in origin, with about 80 percent of their rifles being variants of the basic Model 1891 Mosin-Nagant. Since thousands of these rifles could be acquired throughout central Europe during the 1920s, it became the army's standard weapon. The paramilitary Defense Corps continued their activities after the civil war as a voluntary organization until 1944. Among other activities, the Corps established its own small arms factory in Riihimäki, called SAKO (Suojeluskuntain Ase- ja Konepaja Oy—Arms and Machine Factory of the Defense Corps). Valtion Kivääritehdas, the State Rifle Factory (VKT), was built by the government in 1926 at Jyväskylä.

Although Finnish forces were equipped with sufficient numbers of handguns for their war for independence, the range of models was staggering. The most common type was the Model 1895 Russian Nagant revolver, but because they favored self-loaders, the military purchased 9,000 Spanish-made 7.65mm Ruby-type pistols from France in 1919 (in Finland these pistols were called the *Pistooli malli/19*). In 1923, the Finnish army and the Defense Corps officially adopted the commercial model of the 7.65mm Parabellum pistol, which was procured mainly from Deutches Waffen- und Munitionsfabriken (more than 5,000 pistols between 1923 and 1935). During the 1920s, these *Pistooli m/23 Pb.* were equipped with wooden shoulder stocks. Originally issued with 95-millimeter barrels, during repairs at army depots they were fitted with 95mm and 120mm barrels manufactured by the Tikkakoski small arms factory. The new barrels were manufactured in 7.65mm and 9mm Parabellum caliber. In the late 1920s, the Finnish Army decided to develop a domestic handgun that could be manufactured at Valtion Kivääritehdas. Aimo Johannes Lahti (1896–1970) was the designer of the successful candidate pistol.

*Finnish for Finland.

FIGURE 15–1. Imperial Russian Army officers training with the Model 1895 Nagant revolver in Poland, circa 1909–1911. In the foreground is Carl Gustav Emil von Mannerheim, commander of the Vladimir Uhlan Regiment based in Warsaw. *(Sotamuseo)*

FIGURE 15–2. A typical Finnish army m/19 service pistol, as made by Spanish manufacturers. *(Sotamuseo)*

FIGURE 15–3. Service pistol m/23 with Tikkakoski 120-millimeter barrel. *(Sotamuseo)*

FIGURE 15–4. Finnish m/23 Parabellum with 95-millimeter barrel, shoulder stock, and holster. *(Sotamuseo)*

FIGURE 15–5. Finnish reservists shooting the m/23 Parabellum pistol with shoulder stocks at the Reserve Officers' School in 1929. *(Sotamuseo)*

AIMO LAHTI

Aimo Johannes Lahti was an extraordinary man who was born on 28 April 1896. After completing his basic schooling he worked as a station hand for the Finnish Railways. In 1921 after his compulsory service in the military, he decided to stay in the army as an armorer-artificer in an infantry regiment. Having exhibited technical prowess as a designer, having worked up a submachine gun design in 1922, Lahti was transferred to the ordnance section of the Ministry of Defense three years later. He worked with Captain A. E. Saloranta in creating a light machine gun, which was adopted in 1926 as the Lahti-Saloranta light machine gun (LS-26), and in 1928 he was assigned to the State Rifle Factory (VKT) to oversee its production.

In 1932, the Ministry of Defense established the office of "light weapons constructor," and Lahti was appointed its chief, even though he continued to work at VKT. During the 1930s, he oversaw the production of his submachine gun* and a pistol of his own design. The first prototype of Lahti's self-loader appeared in 1929. Over the next two years, he improved his design and had it ready for production by 1932. But the Valtion Kivääritehdas was busy manufacturing light machine guns and other equipment and did not start production of the *Pistooli L-35* for three more years.

Lahti's pistol operated on a short-stroke recoil basis (protected by Finnish patent 15,716, 16 February 1934). During the initial stage of the recoil cycle, the bolt was locked to the barrel extension assembly until the whole mass had moved about 8 millimeters to the rear. At that point, a vertically-moving yoke (an inverted U-shaped locking block) was cammed upward by cam surfaces cut into the frame. When the yoke was in its elevated position, the bolt was freed to continue its rearward movement. Several authors, starting with R. K. Wilson and Ian V. Hogg in their *Textbook of Automatic Pistols,* have alleged that the Lahti locking system was based on the Bergmann-Bayard military pistol, but there is no Finnish documentation to substantiate this conjecture. As interesting as the locking system is, it would not have been very reliable under adverse weather conditions, of which

*This 7.65mm Parabellum submachine gun had first been manufactured by Konepistooliosakeyhtiö (Submachine Gun Co., Inc.) in 1926, with the bulk of the m/26s being purchased by the military. In 1931, the army adopted an improved Lahti submachine gun, the m/31 "Suomi," manufactured from 1932 to 1944 by the Tikkakoski factory. More than 80,000 of these 9mm Parabellum weapons were built.

FIGURE 15–6. Aimo Johannes Lahti (1896–1970). *(Sotamuseo)*

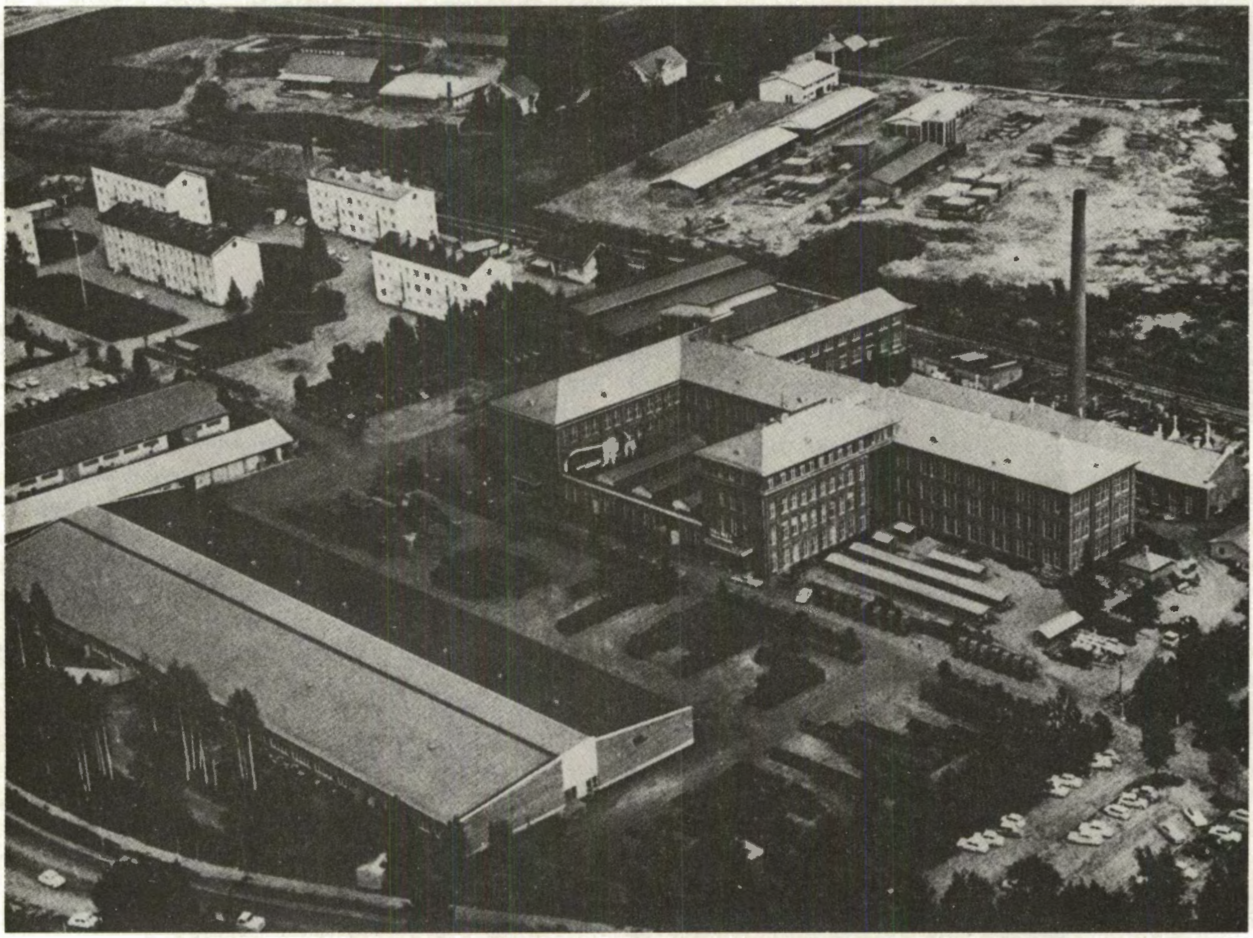


FIGURE 15–7. The Valtion Kivääritehdas (VKT), State Rifle Factory, at Jyväskylä. *(Sotamuseo)*

FIGURE 15–8. Aimo Lahti's design bureau at the State Rifle Factory in the 1930s. *(Sotamueso)*

Finland has its share, had it not been for the inclusion of an accelerator. By the time the bolt was unlocked from the barrel assembly, most of the original impulse imparted to the bolt had been dissipated. Therefore, it was necessary to provide an extra impulse to the bolt to ensure reliable operation. The concept seems to have worked because the Lahti pistol (all of the pistols produced for the Finnish army had accelerators) had a good reputation for performance, even in the coldest and dirtiest of conditions.

The accelerator was a simple, two-armed lever pivoted on the left side of the receiver. As the receiver and bolt recoiled, locked together, the lower portion of the accelerator bore upon the frame and rotated the lever around its central pivot. As the yoke rose into the roof of the receiver, the longer arm of the accelerator came into contact with the left side of the recoiling bolt. Given its design, the accelerator had a mechanical advantage that permitted it to move faster than the other recoiling parts, thereby giving the bolt an extra impulse.

During the years from 1935 to 1944, over 9,000 Lahti pistols were manufactured by the Valtion Kivääritehdas.* Of that number, about 6,000 were delivered to the Finnish army. The remainder were sold commercially to Finnish civilians and exported to Sweden and elsewhere. (Swedish deliveries in the 1950s were about 2,000 units.) In 1940, the Swedish government acquired a production license for the L-35. To replace their m/07 pistols (Browning 1903s), production of which continued until 1942, the Swedish army had adopted the Walther P-38 as their *automatisk repeterpistol m/39,* but the coming of the Second World War interrupted their plans to acquire it. They turned to the Finns' Lahti pistol and adopted it as the *automatisk repeterpistol m/40.* Between 1942 and 1946, the Husqvarna Vapenfabriks manufactured about 83,000 m/40s for the Swedish army and about 842 for commercial sale.† Total production of the Lahti by both countries was about 94,000.

The Finns produced a number of variants of the L-35, the result of improvements introduced by Lahti during the manufacturing cycle. Finnish authorities distinguish among the four production model variations, while some collectors try to distinguish numerous subtypes. Table 15–1 will help explain the different models. Before the Finnish army adopted the Lahti pistol, a series of about 100 pistols (with serial numbers beginning at 1,000) was produced for field trials. All of the pistols, serial numbers 1,001 to 6,731, manufactured for the Finnish army had a loaded chamber indicator and an accelerator. The four types can be distinguished as follows.

The Type I (serial numbers 1,105 to ca. 3,700) had the housing for the yoke locking piece and the loaded chamber indicator. Type II did not have the hump for the yoke locking piece, but it did have a loaded chamber indicator of the early type. Type II pistols had serial numbers ranging from ca. 3,701 to ca. 4,700. Type III had a thicker receiver, and a simpler and more rectangular-shaped loaded-chamber indicator. Type III pistols had serial numbers in the 4,701 to 6,800 range. These three types were manufactured in a continuous series from serial 1,105 to 6,731. Pistols rejected by army inspectors were sent back to the factory and sold to civilians. These were assigned a special serial number series beginning about V0100 and continuing to about V0400. In the 1950s newly manufactured receivers, Type III and Type IV (without the loaded-chamber indicator) were finished at Valmet using unfinished parts left from 1944, when the armistice stopped the manufacture of the L-35 pistols. At the same time the Vammaskoski factory fabricated all new receivers (Type IV with only L-35 and the army SA mark). These new receivers were sent to army repair depots so wartime pistols (Types I to III) could be repaired. The original serial number

*Of this 9,000 figure about 2,000 remained unfinished at the end of the war. These were assembled in the 1950s and were the pistols shipped to Sweden.

†Some of these pistols were used by Free Danish forces. After the war they were used by the Danish police for a number of years.

TABLE 15-1 FINNISH MILITARY PISTOL "LAHTI" PROTOTYPES, EXPERIMENTAL TYPES, REGULAR PRODUCTION TYPES (AND THEIR SUBTYPES)

	L–29 Prototype	*L–31 Prototype*	*L–29/35 Prototype*	*L–35 Field test series (100 pistols)*	*L–35 Type I*	*L–35 Subtype Ia 2d class*	*L–35 Type II*	*L–35 Subtype IIa 2d class*	*L–35 Type III*	*L–35 Subtype IIIa 2d class*	*L–35 Type IV Post WWII Commercial*
Approximate range of serial numbers				**1001–1104**	**1105–3700**	**001–ca. 100**	**3700–4700**	**ca. 100–150**	**4700–6800**	**ca. Vo150–V0400**	**6800–9100**
Years of manufacture	**1929**	**1931**	**1935**	**1938**	**1939–41**	**1940–41**	**1942**	**1942(43)**	**1944–45**	**1944–54**	**1952–54**
Grip plates of wood (w) or bakelite (b)	**w**	**w**	**w**	**w/b**	**b**	**b**	**b**	**b**	**b**	**b**	**b**
Yoke locking piece and receiver extra return construction				**x**							
Loaded chamber indicator			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
Shoulder stock lug			**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
Markings indicating manufacturer	**Army Depot**	**VKT**	**VKT**	**VKT**	**VKT**	**VKT**	**VKT**	**VKT**	**VKT**	**VKT and Valmet**	**Valmet**
Manufactured for	**Aimo Lahti's Experiments**	**Army Experiments**	**Samples for the Army**	**Army Field Test**	**Army**	**Commercial**	**Army**	**Commercial**	**Army**	**Commercial**	**Commercial/ export**
Standard L–35 magazine					**x**	**x**	**x**	**x**	**x**	**x**	**x**
Subtypes resulting from rebuilding of the L–35:*											
Using Valmet spare parts receiver, Type III					**x**				**x†**		
Using Valmet spare parts receiver, Type IV					**x**		**x**		**x**		
Using Vammaskoski spare parts receiver, Type IV					**x**		**x**		**x**		

*The number of L–35 pistols rebuilt with new receivers of the three types (1950–1980) was about 1,000–1,500. With few exceptions, these have been army service pistols, so second-rate "civil" and post-WWII commercial types with replacement receivers are possible but quite unusual.

†Marked Valmet rather than VKT.

FIGURE 15–9. Lahti's 1929 prototype pistol. *(Sotamuseo)*

FIGURE 15–10. The first type of L-35, manufactured for the army (serial numbers starting with 1001). The first 100 pistols were equipped with special slide return springs (note the rod under the chamber). ***(Sotamuseo)***

FIGURE 15–11. A modified L-35 without the locking-piece retaining spring. ***(Sotamuseo)***

FIGURE 15–12. An L-35 pistol of wartime manufacture. Note the simpler slide. *(Sotamuseo)*

FIGURE 15–13. The final variation of the L-35, this pistol was assembled for export after the Second World War using parts that were leftover from wartime production. This variation does not have the loaded chamber indicator or the lug for the shoulder stock. It carries the Valmet markings. *(Sotamuseo)*

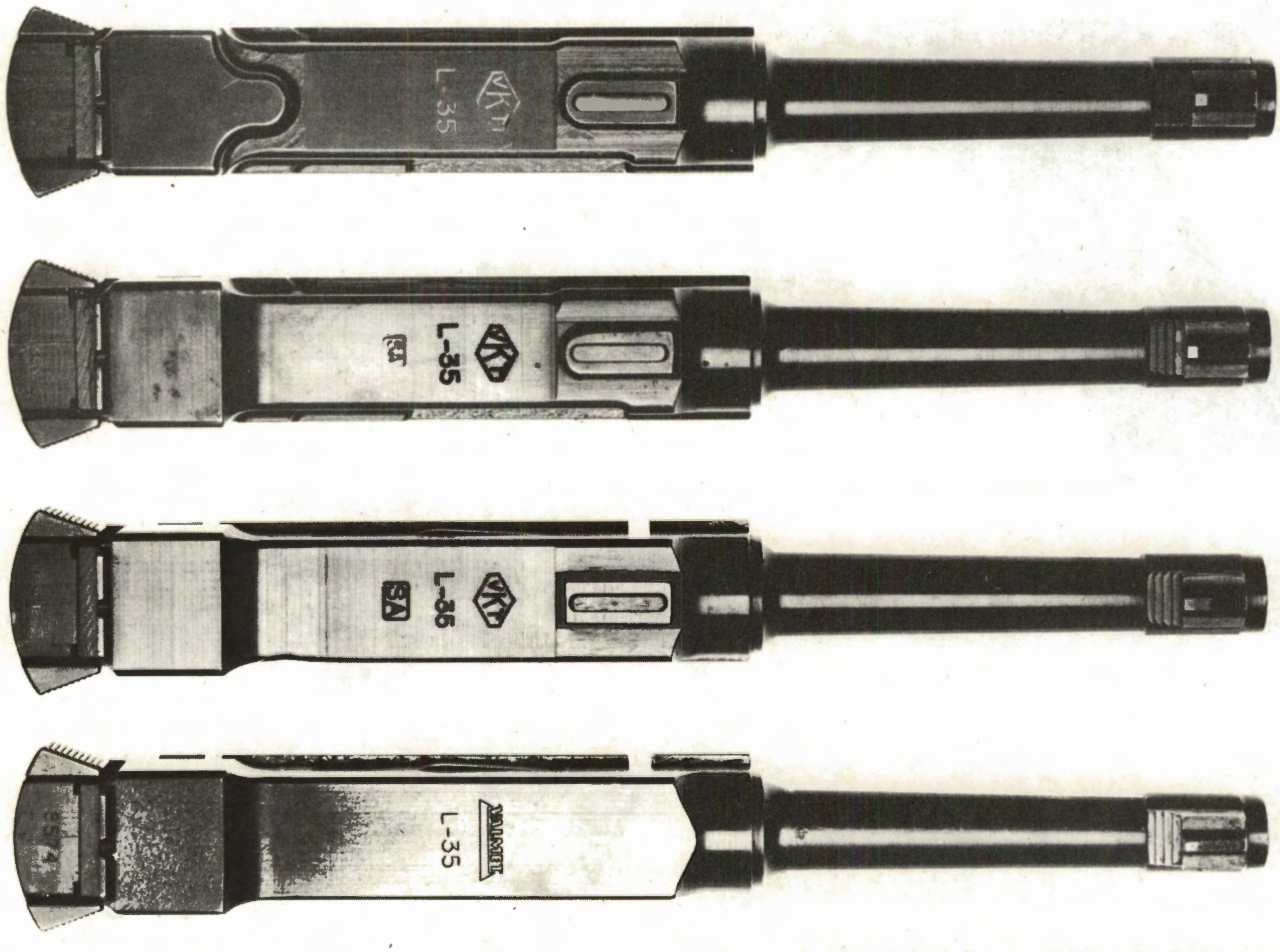


FIGURE 15–14. The evolution of the L-35 slide. *From top to bottom,* serial numbers 014, 4350, 6412, and 8574. *(Sotamuseo)*

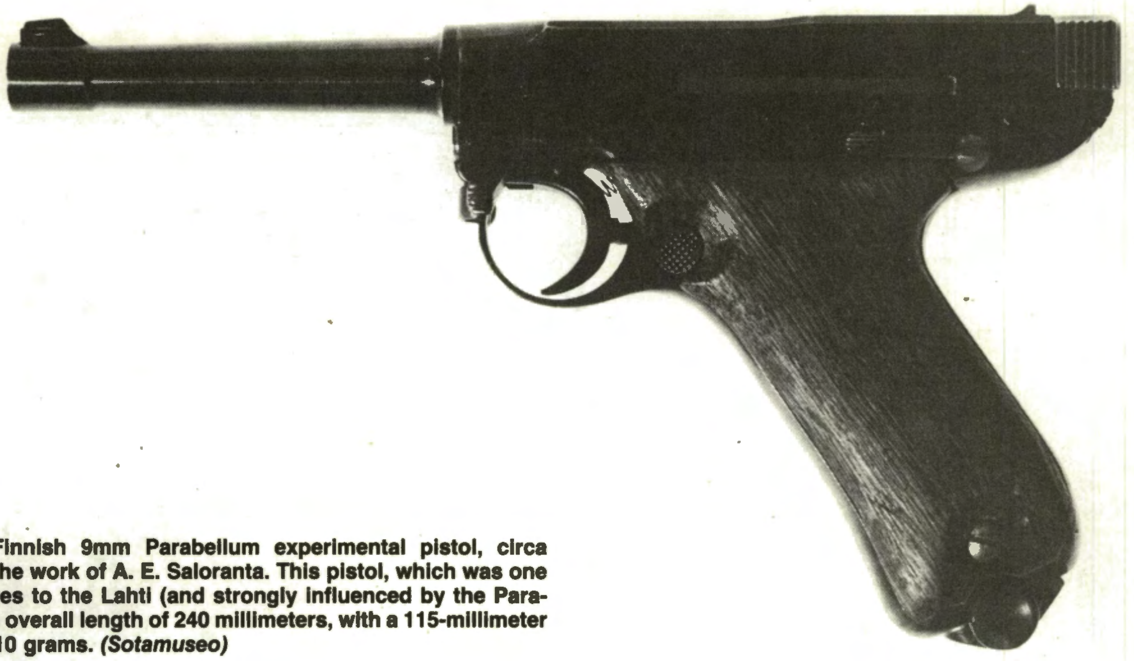


FIGURE 15–15. A Finnish 9mm Parabellum experimental pistol, circa 1930–1935, possibly the work of A. E. Saloranta. This pistol, which was one of the early alternatives to the Lahti (and strongly influenced by the Parabellum-Luger), had an overall length of 240 millimeters, with a 115-millimeter barrel. It weighed 1,110 grams. *(Sotamuseo)*

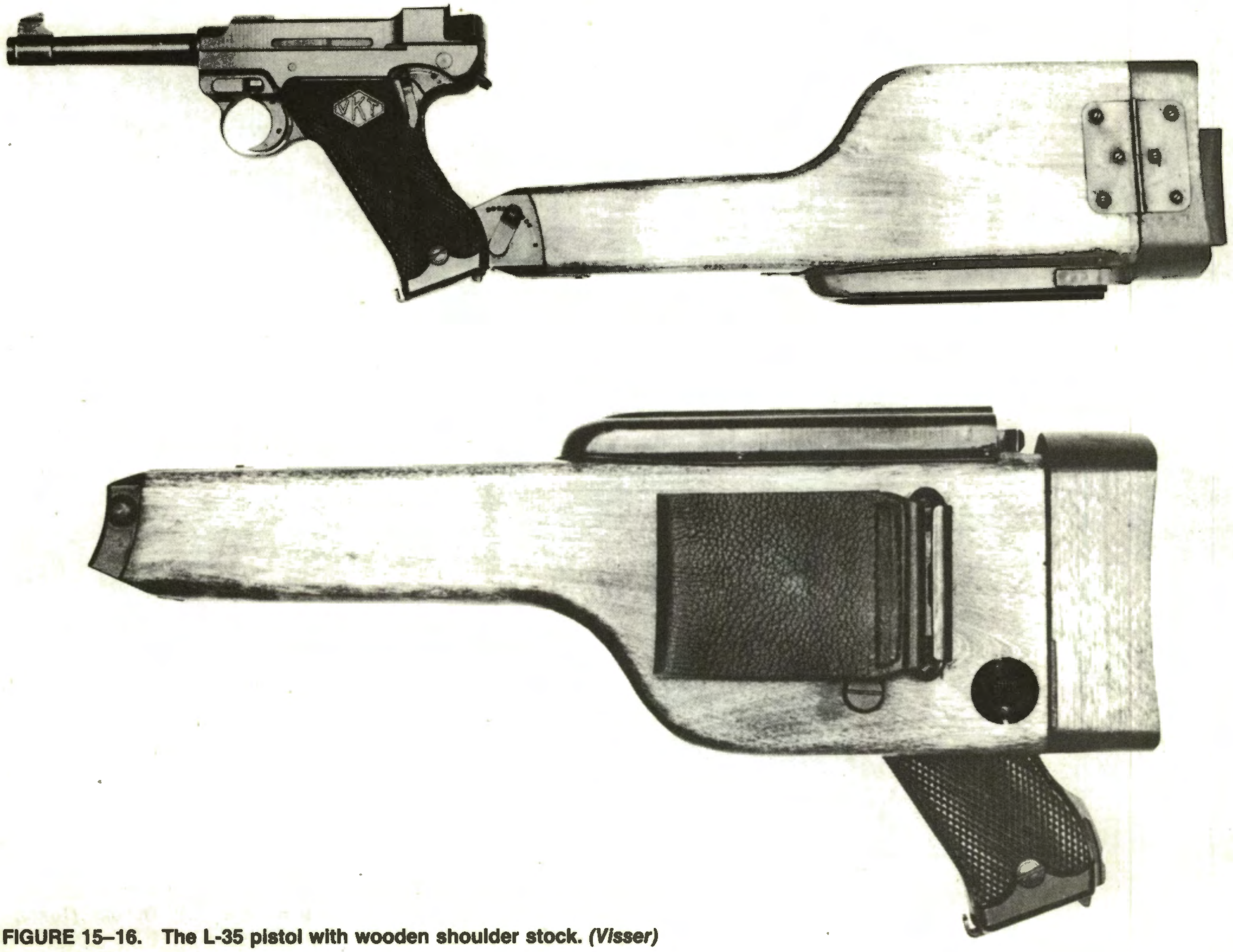


FIGURE 15–16. The L-35 pistol with wooden shoulder stock. *(Visser)*

FIGURE 15–17. The Swedish m/40 Lahti pistol fabricated by Husqvarna Vapenfabriks (serial number A.B. D5902). *(Tokoi, Nonte)*

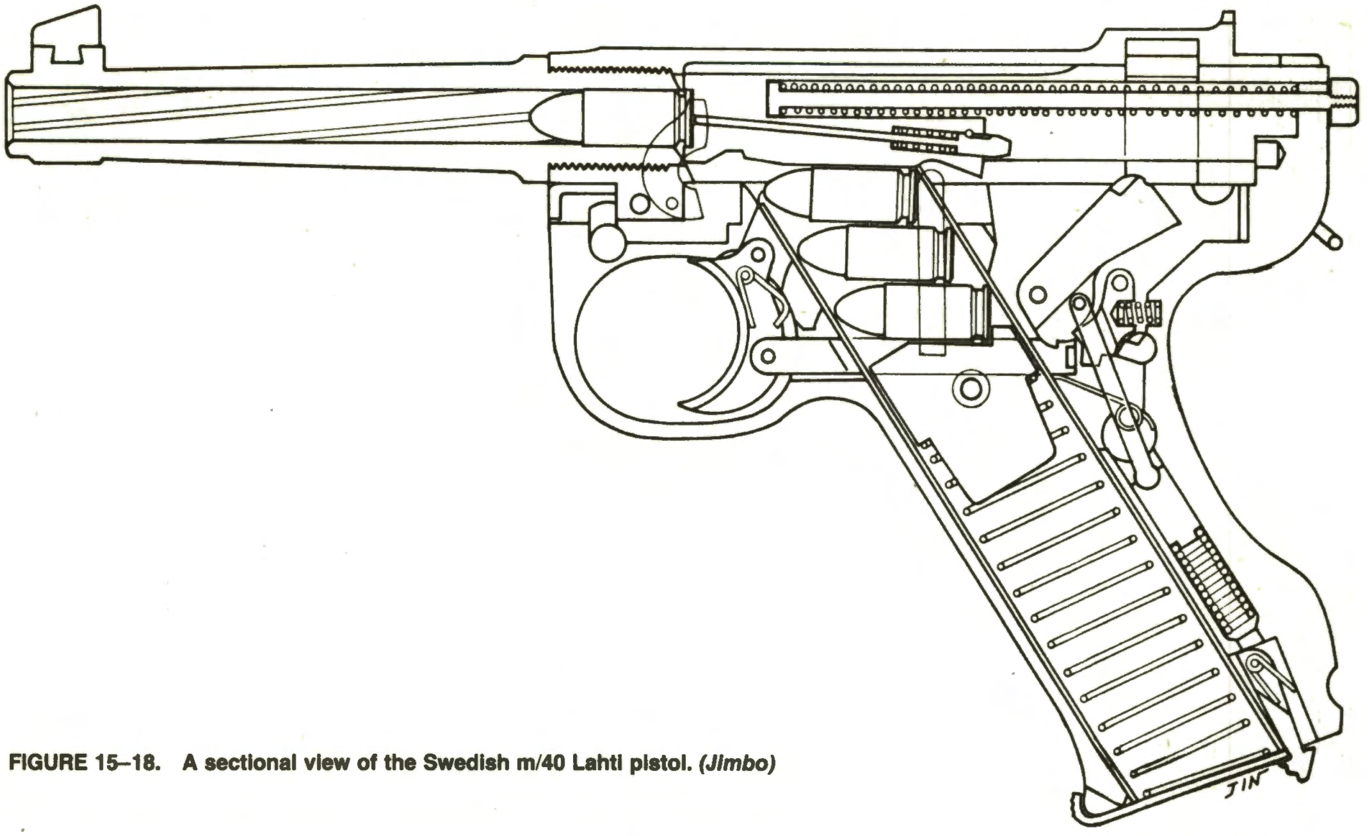


FIGURE 15–18. A sectional view of the Swedish m/40 Lahti pistol. ***(Jimbo)***

of the gun was always engraved on the new receiver. Thus there are identifiable subtypes because of this rebuild program.

There were also Type IV pistols (serial numbers 6,800 to ca. 9,100) assembled from parts that were finished from 1952 to 1954. Valmet bought the rights to utilize these components from the Finnish army. These pistols do not have the loaded-chamber indicator or the shoulder-stock mounting lug. Some of these were sold commercially in Finland, but most were exported to Sweden. In 1937, about fifty wooden shoulder-stocks, which also could be used as holsters, were issued on an experimental basis. This accessory was never officially adopted, but all of the wartime pistols had the stock mounting lug at the base of the grip.

In 1940, Finnish air force pilots were issued FN Model 1935 High Power pistols, and during 1941 to 1943 the Finns purchased Italian, Spanish, and Czech pistols from the Germans. Figure 15–22 depicts the property marks used by the Finnish army (Suomen Armeija) and Defense Corps organizations on domestic and foreign pistols that were issued from 1918 to 1945. Since there was a continuing need for 9mm Parabellum caliber self-loaders, the staff at VKT designed the 1944 model military pistol, which had a stamped sheet-metal frame and slide to reduce the cost and time of

TABLE 15-2 CHARACTERISTICS OF PISTOLS OF FINNISH MANUFACTURE

	*m/Ahlberg**	*L–35 Lahti*	*m/44 Experimental*
Caliber (mm)	**7.62 Browning**	**9 Parabellum**	**9 Parabellum**
Overall length (mm)	**170**	**240**	**195**
Barrel length (mm)	**103**	**120**	**110**
Weight (grams)	**575**	**1,260**	**1,080**
System of operation	**blowback**	**recoil**	**blowback**
Magazine capacity	**7**	**8**	**8**
Sights, front **Sights, rear**	**milled groove** **on the slide**	**blade** **U-notch**	**blade** **U-notch**
Muzzle velocity (meters per sec)	**255**	**325**	**325**

*A copy of the FN Browning Modèle 1910; see chapter 5.

1. Barrel
2. Accelerator retainer spring
3. Accelerator retainer
4. Accelerator
5. Recoil spring
6. Recoil spring guide
7. Frame
8. Takedown catch spring
9. Takedown catch
10. Hold-open catch
11. Hold-open catch spring
12. Trigger spring pin
13. Trigger
14. Trigger pin
15. Trigger spring
16. Trigger bar pin
17. Disconnector
18. Trigger bar
19. Trigger bar spring
20. Safety lever and catch
21. Magazine catch pin
22. Magazine catch spring
23. Magazine catch
24. Magazine
25. Hammer spring
26. Hammer spring plunger
27. Hammer strut
28. Hammer
29. Sear
30. Sear spring
31. Sear pin
32. Hammer strut pin
33. Hammer pin
34. Spring guide nut
35. Firing pin spring
36. Firing pin
37. Bolt
38. Firing pin retainer pin
39. Extractor
40. Ejector
41. Yoke (locking block)

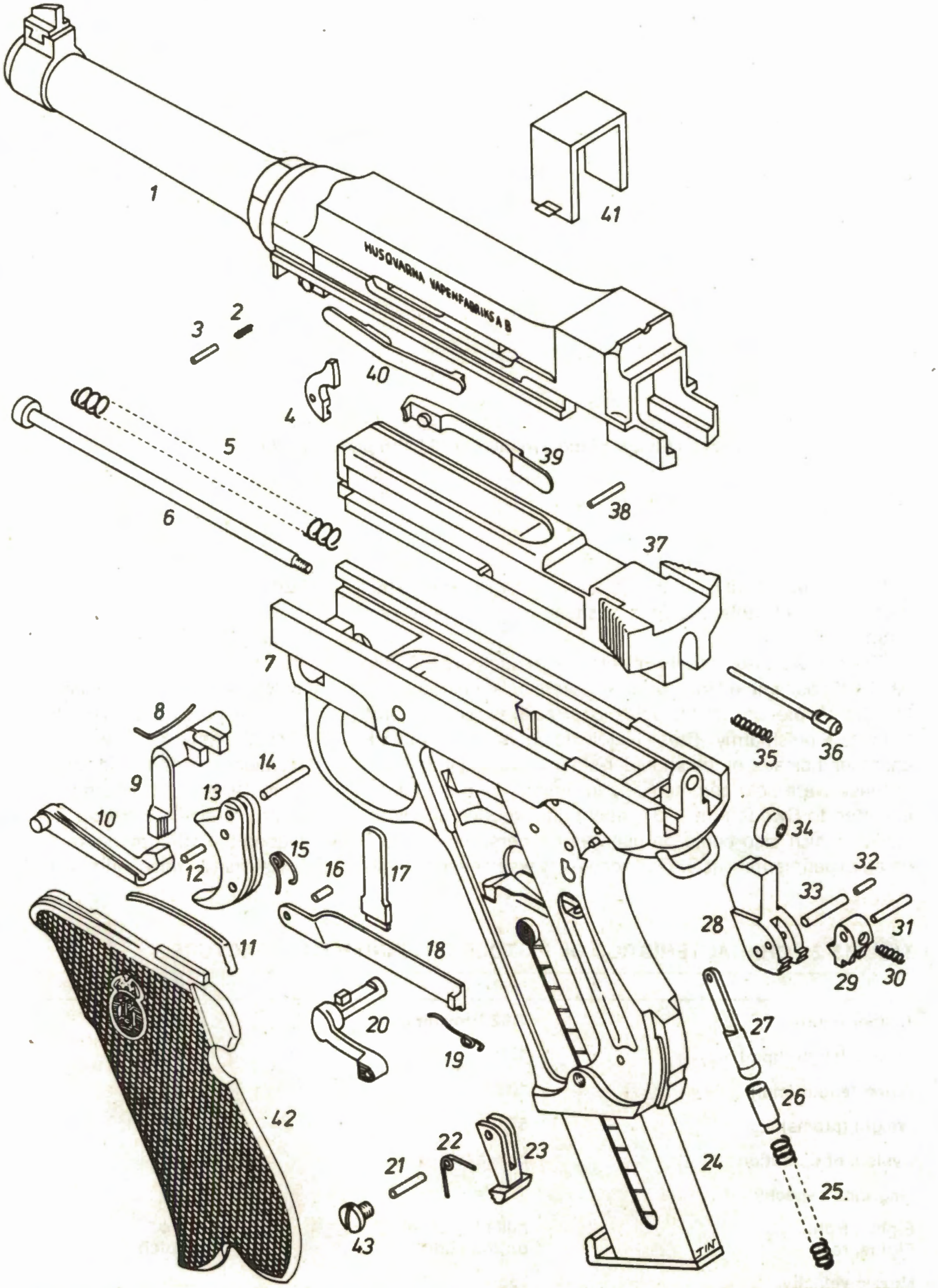


FIGURE 15–19. Exploded view of the Swedish m/40 9mm Parabellum Lahti L-35 self-loading pistol. *(Jimbo)*

FIGURE 15–20. Colonel Aaro O. Pajari during the Winter War (2 February 1940) carrying an L-35 pistol. Note the open-top holster. *(Finnish Defense Ministry)*

manufacture.* This blowback pistol, of which only 26 were made, had a fixed barrel that could be rotated for removal, much like the Colt-Browning pocket automatic pistol. The block into which the threads of the barrel locked was spring-loaded and removable and acted as a buffer to slow the forward movement of the slide on the loading stroke. The weight of the slide permitted the use of the 9mm Parabellum cartridge. As in the Tokarev pistol, after which it was patterned, the hammer mechanism could be removed as a unit. By 1944, the Finns had ended their participation in the Second World War and plans to produce the m/44 were shelved.† Some Soviet members of the Allied Supervisory Commission in Finland after the war became interested in the m/44 design. As a result, the production drawings and related technical data, experimental tooling, and at least one prototype were sent to the Soviet Union. The project went no further in Finland.

Despite the fact that Finland never produced self-loading

*Aimo Lahti may have offered some technical assistance on this project, but this is not a Lahti design. He was involved with the creation of aircraft guns and other weapons projects, so he did not have much time for this pistol project.

†They called World War II the "Continuation War" in Finland, considering it the continuation of the Finns' Winter War with Russia, 1939–1940.

FIGURE 15–21. Brigade Commander Major Kämäri giving a battle order during World War II, using his L-35 pistol as a pointer. *(Finnish Defense Ministry)*

pistols in substantial quantities, the Lahti L-35 and the experimental VKT m/44 were excellent military handguns. Throughout Scandanavia, the Lahti had an excellent reputation for operating when other handguns and self-loading weapons would not. Lahti's genius lay in the creation of weapons that suited the special tactical and climatic needs of his country's armed forces.

NOTES

This chapter was based upon the following materials:
Lehrer, D. R. "Lahti's Finnish Pistols," *American Rifleman* (August 1969): 28–29.

Palokangas, Markku. "Use and Manufacture of Military Small Arms in Finland during Independence, 1918–1978." Written for this book, Helsinki, Finland: Sotamuseo, 1979.

———. "Suomalaisen Sotilaspistoolin L–35 Kehittaminen ja Tuotanto," from forthcoming Finnish book.

Walter, John. "Simply Reliable: Finland's Lahti Pistol," *Shooter's Bible, 1981,* (South Hackensack, NJ: Stoeger Publishing Co., 1980): 103–112.

FIGURE 15–22. A 9mm Corto Model 1934 Beretta manufactured in 1942 with the property markings of the General Headquarters of the Finnish Defense Corps (Sk.Y stands for Suojeluskuntain Yliesikunta). *(Visser)*

FIGURE 15–23. A 7.62mm Tokarev pistol captured by the Finnish army, which carries the Finnish Defense Force's markings. *(Interarms)*

FINNISH SMALL ARMS MANUFACTURE MARKINGS 1918-1944

VKT = Valtion Kiväärltehdas (State Rifle Factory)

= Tikkakoski

= Sako = Suojeluskuntain Ase- ja Konepaja Oy (The Arms and Machine Factory of Defence Corps)

= Army Ordnance Depots, various initials

= The Leonard Lindelöf Engineering Works

FIGURE 15–24.

PROPERTY MARKINGS IN FINNISH MILITARY SMALL ARMS

SA = Suomen Armeija (Finnish Army)

= Suomen puolustusvoimat (The Defence Forces of Finland) replaced the SA in the early 1970's

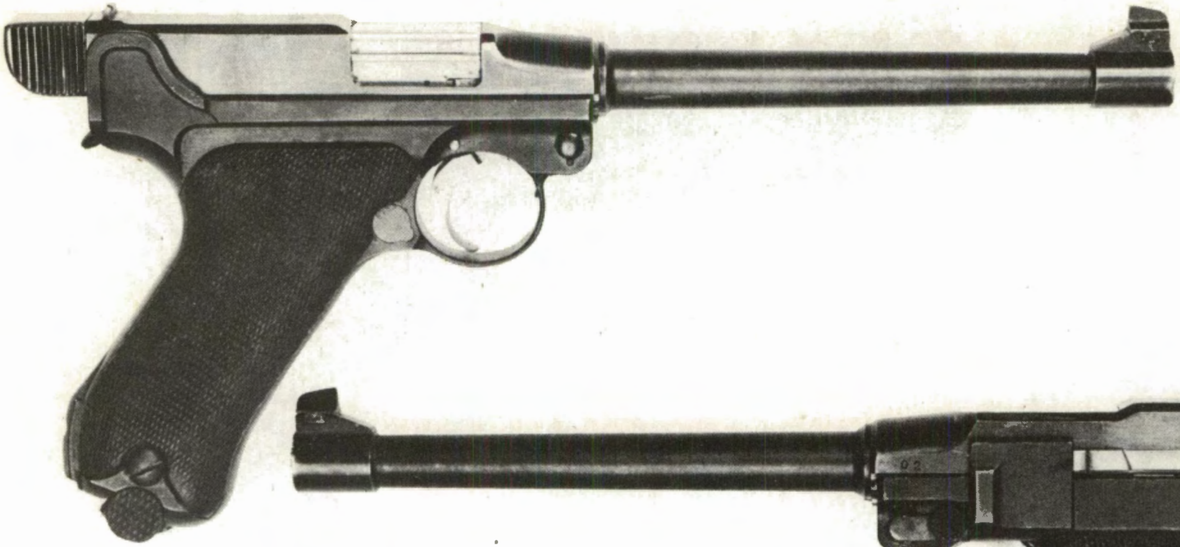
= Suojeluskuntajärjestö (Defence Corps Organization)[1]

SY
SkY = Suojeluskuntain Yliesikunta (The General H.Q. of the Defence Corps)[1]

1. official till 1944

FIGURE 15–25.

FIGURE 15–26. The experimental m/44 pistol manufactured by VKT. *(Sotamuseo)*



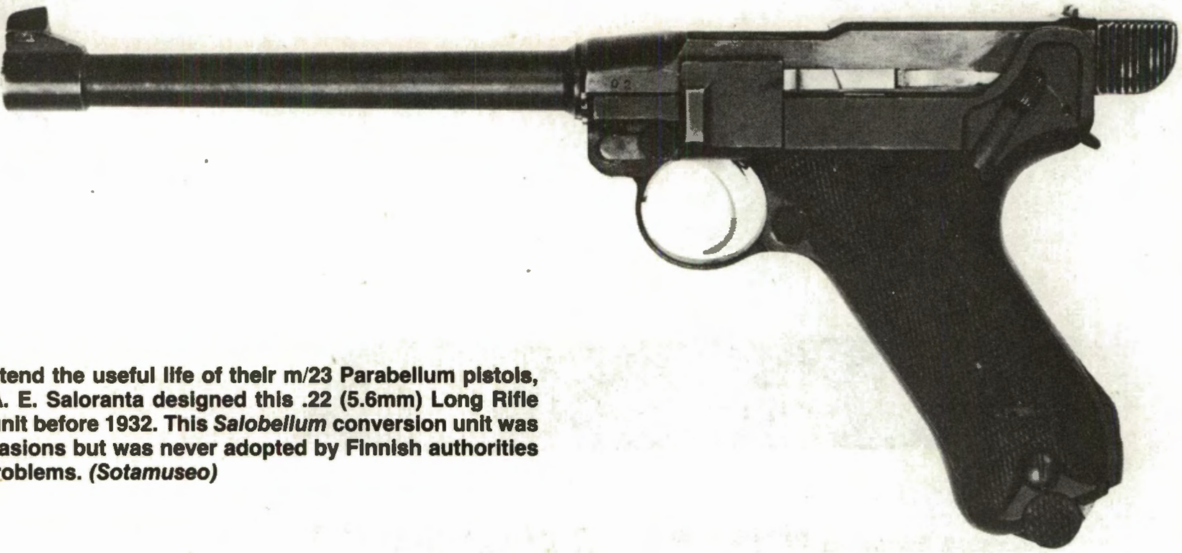
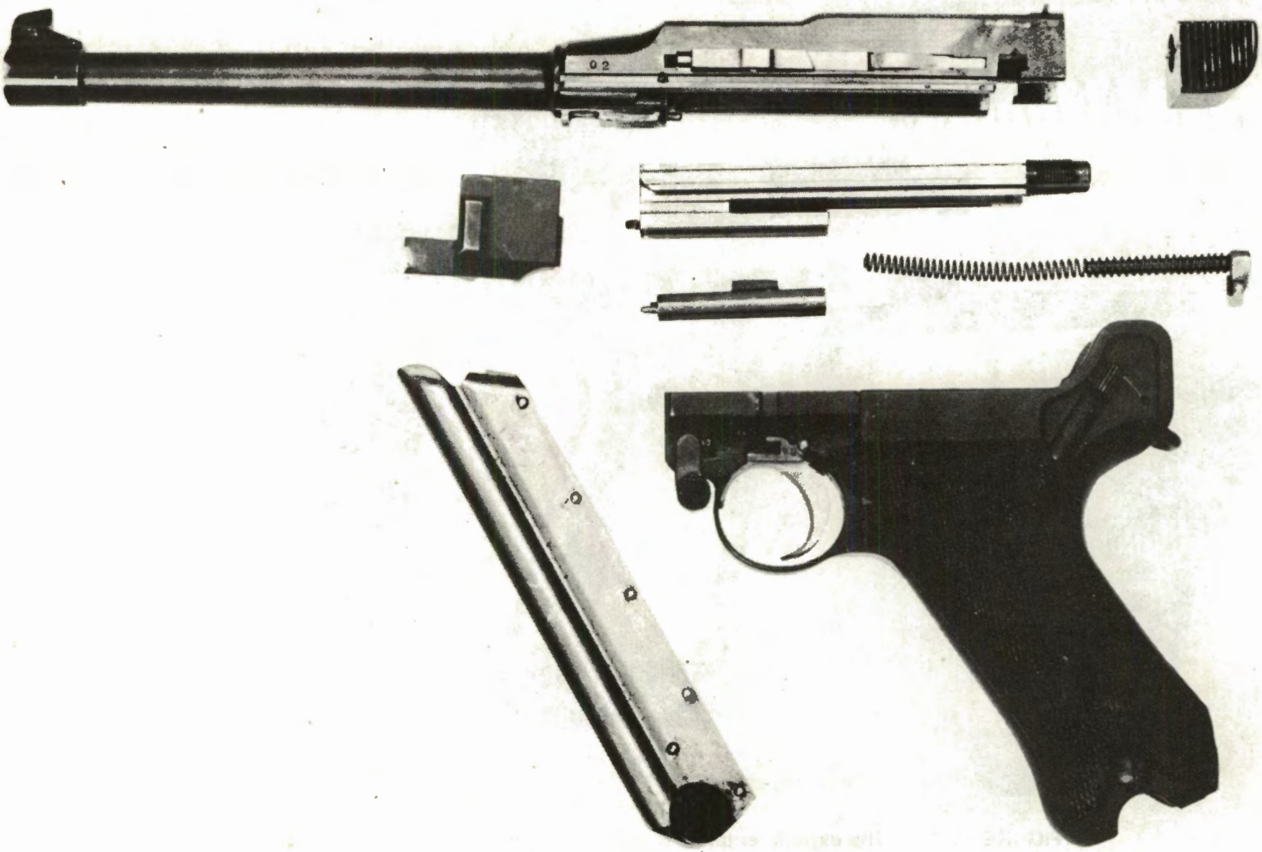


FIGURE 15–27. To extend the useful life of their m/23 Parabellum pistols, the Finnish designer A. E. Saloranta designed this .22 (5.6mm) Long Rifle blowback conversion unit before 1932. This *Salobellum* conversion unit was studied on several occasions but was never adopted by Finnish authorities because of financial problems. *(Sotamuseo)*



16 JAPANESE HANDGUNS 1870 to 1945

The Japanese experience with firearms was unique in many respects, and this historical legacy affected the development of both handguns and shoulder-fired weapons. The Portuguese introduced firearms to Japan in 1543, and after a brief (less than 100 years) but violent period the Japanese outlawed guns. From 1637 to 1853, only a small number of matchlocks were manufactured, and even fewer were used in military activities. Noel Perrin has discussed this phenomenon in *Giving up the Gun: Japan's Reversion to the Sword.* Warfare in Japan had become ritualized by the mid-1500s, and firearms had disrupted that ritual and destroyed a form of warfare based upon personal bravery and skill with the sword and bow. Firearms gave even the lowest class of person the power to slay the most highly trained samurai. This threat was not ignored by the Japanese warrior class, which by the end of the 1500s numbered nearly 2 million, about 8 percent of the population (the "warrior" class in England at this time was no stronger than 30,000, or about .6 of one percent). The samurai wholeheartedly supported the government's efforts to restrict and later eliminate the production of all firearms, military and sporting.[1]

When Commodore Perry's fleet arrived in Japan to open trade between the Japanese and the Americans in 1853, his men were armed with Colt revolvers, percussion muskets, and the most up-to-date muzzle-loading cannons. To the Japanese, these weapons represented a major technological jump from the antiquated matchlocks they sometimes carried on ceremonial occasions. The final decades of the nineteenth century were ones of rapid technological change on the islands as the Japanese played a game of catch-up. In so doing, they developed a reputation for being clever copiers of foreign technology. The fact that they sought out western technology and copied it has led some western commentators to diminish their accomplishments, but put into perspective the accomplishments of the Japanese were spectacular. They jumped from the matchlock era to the breech-loading era in twenty years. In just a little more than fifty years after Commodore Perry's visit, the Japanese navy was able to challenge and defeat the army of China and the army and navy of Imperial Russia.

The Japanese military chose the Smith & Wesson .44 caliber (11.18mm) Second Model Russian Revolver as their first cartridge handgun. In 1877, H. Ahrens and Company of Yokohama acquired 5,000 of these revolvers, which were issued to military police and naval and diplomatic personnel. In 1878, Ahrens bought 1,000 Third Model Russian Revolvers for the Imperial Navy. The following year, an additional 832 pistols were purchased on behalf of the government by Takata and Company of Yokohama. Sixteen years later in 1895 and 1896, the Japanese procured 786 Frontier pattern New

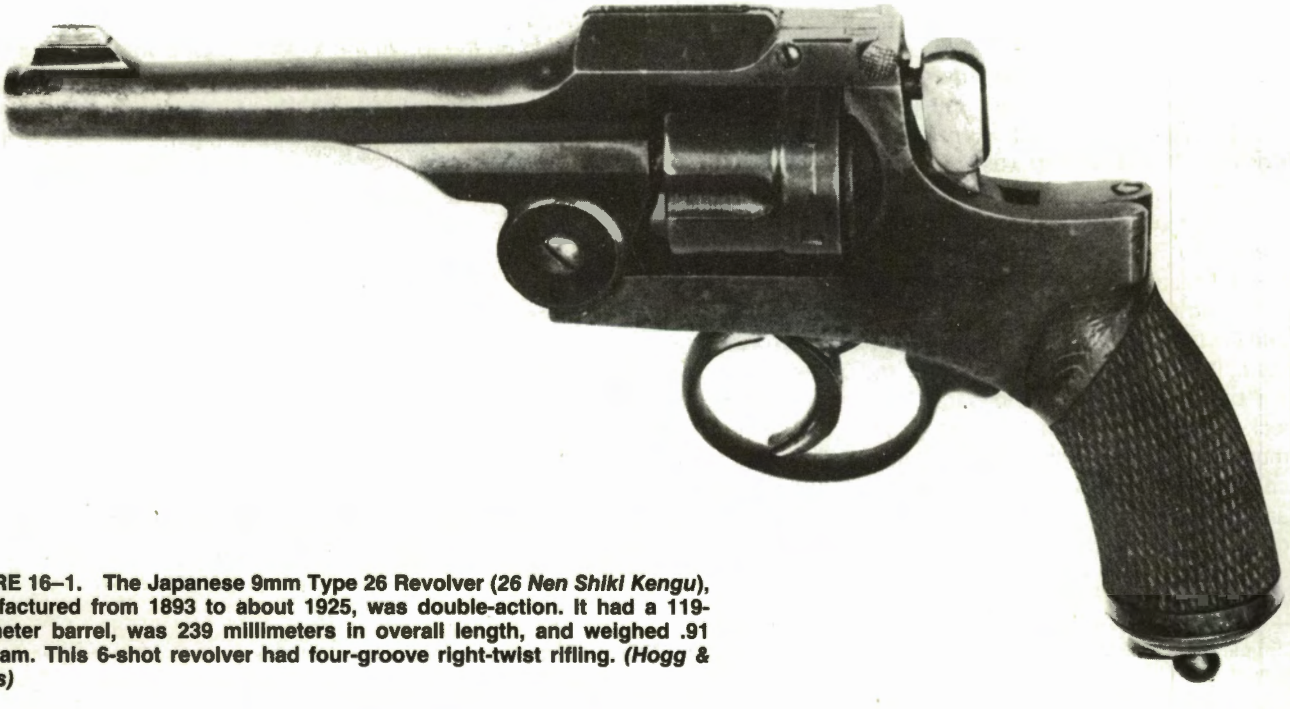


FIGURE 16–1. The Japanese 9mm Type 26 Revolver (*26 Nen Shiki Kengu*), manufactured from 1893 to about 1925, was double-action. It had a 119-millimeter barrel, was 239 millimeters in overall length, and weighed .91 kilogram. This 6-shot revolver had four-groove right-twist rifling. *(Hogg & Weeks)*

Model 3s chambered to fire the .44 Smith & Wesson Russian cartridge.[2]

26 NEN SHIKI KENJU (TYPE 26 REVOLVER)

In 1893, the Japanese Imperial Army adopted the *26 Nen Shiki Kenju (Type 26 Revolver).* The designation was derived from the Japanese calendar; 1893 was the 26th year of the Meiji era. This six-shot, 9mm, hinged-frame, double-action revolver was a collection of ideas borrowed from other handguns. The lock mechanism was essentially the same as that used in the Galand revolver; the hinged frame and frame latch were borrowed from the Smith & Wesson Number 3, and the hinged side plate covering the lock work was adapted from the French Modèle 1892 Ordonnance Revolver. The Type 26 revolver was intended to be used only as a double-action weapon, so the hammer was not provided with a thumb spur for single-action cocking. It was chambered to fire a 9mm rimmed cartridge of Japanese origin, and its 9.65-gram projectile had a muzzle velocity of about 200 meters per second. Production of the Type 26 revolver began in 1893 and continued until the mid-1920s, when it was officially superseded by the Type 14 Nambu self-loading pistol. Accurate production data for the Type-26 are not available, but examples have been found with serial numbers in the 50,000 range. The quality of the pistol varies with the date of production, but generally the work done at Koshigawa Arsenal in Tokyo (later known as Kokura Arsenal) was good. Many of these weapons were still being issued to rear echelon troops as late as 1945.

EARLY SELF-LOADING PISTOL EXPERIMENTATION IN JAPAN

By the early years of this century, several designers in Japan had begun to experiment with self-loading pistols. Among the first to build such a weapon were Kumaso Hino and Tomisiro Komuro. Their handgun was notable because it was one of a very small number of guns that operated on the blow-forward principle, the other two of note being the 1894 Steyr Mannlicher and the 1908 Schwarzlose. The Hino-Komuro pistol, which first appeared in 1904 (U.S. patent 886,211 of 1908 and British patent 5,284 of 1907), had a fixed breech, and the barrel assembly was blown forward upon discharging the cartridge. The pistol was loaded and cocked by grasping the barrel and pulling it forward. A trigger-operated catch locked the barrel in the forward position, and the forward motion operated a cartridge lifter, which positioned a cartridge so that the barrel could close over it. The barrel was released and the pistol fired by pulling the trigger and squeezing the grip safety. The first motion freed the barrel so that it could move to the rear enough to cover the nose of the bullet. Squeezing the grip safety released a second catch, allowing the barrel to complete its closing stroke. When the barrel slammed shut, the cartridge was forced against the fixed firing pin in the breech, and the weapon was fired. The cycle was then repeated, powered by the force of the fired cartridge, with the barrel going forward, the empty case being ejected, and the barrel being locked forward. Production of the Hino-Komuro began in about 1905 and ended in about 1912, with only approximately 1,200 of the 7.65mm Browning caliber pistols having been manufactured in all.

NAMBU PISTOLS

Although Hino and Komuro's handgun project was not very successful, a self-loader designed by Colonel Kirijo Nambu fared much better. Colonel Nambu, Japan's leading small arms expert, first demonstrated his pistol in public in August 1909, when it was shown to the Emperor Taisho during the graduation exercises at the Toyama Imperial Military Academy. As other writers have noted, there has been some confusion about the year of the Nambu pistol's introduction. It had two Japanese designations: *Nambu Shiki Jido Kenju "Ko,"* which meant Nambu automatic pistol Type "A," and *Kaigun kenju yon-nenshiki,* or fourth-year type naval pistol. Some earlier writers took this reference to a fourth year to mean the year 1904, but it actually meant the fourth year of the Taisho era, or 1915.*

The mechanism of the Nambu pistol represented an eclectic combination of ideas—some were borrowed from the Italian Glisenti self-loading pistol, while others were Nambu's own. The frame was a one-piece complicated forging that was difficult to machine, making the pistol expensive to produce. The barrel and barrel extension (or receiver) were also fabricated from a single piece of steel. This barrel and barrel extension assembly reciprocated in the frame during the firing cycle. The bolt moved inside the barrel extension. A lug on the top of the locking block pivoted around a concave-faced block under the receiver, engaging a recess in the underside of the bolt. When the gun was fired and the barrel and receiver recoiled for about five millimeters, the tail of the locking block dropped from its position and released the bolt. The barrel and receiver were stopped by a lug on top of the trigger unit, and the bolt ran back alone to compress the mainspring, which lay in a tunnel alongside the breech where it was compressed by a rod attached to the cocking piece.

These striker-fired pistols had a sear bar that extended to the rear of the action. A very clever design, the sear had a simple and positive disconnector—a spring-loaded plunger attached to its nose. The trigger rotated to lift the sear and disengage the striker, but when the barrel and receiver recoiled, a small lug on the underside of the barrel pushed the plunger backward and disconnected it from the trigger. The sear then moved downward to its original position; the trigger could not lift it again until finger pressure was released to

*Emperor Meiji reigned from 1868 until his death in 1912; Emperor Taisho succeeded him and reigned until his death in 1926; the present ruler, Emperor Hirohito, took the throne in 1926. Posthumously, Hirohito will be known as Emperor Showa.

FIGURE 16–2. This example of the 7.65mm Browning caliber Hino-Komuro blow-forward pistol carries serial number 434. *(Visser)*

FIGURE 16–3. Kijiro Nambu, the designer of the Nambu pistols, in the uniform of a Japanese Imperial Army general, ca. mid-1930s. *(Tokoi-Nambu)*

allow the trigger nose to slip back under the plunger unit. The trigger assembly and the manual safety—a peculiar spring-loaded grip lever that intercepted the trigger—slid in a dovetailed groove in the front of the grip. Within limits, the assemblies were interchangeable. Unlike the later Taisho Type 14 pistol, which was developed from the Nambu, the original design did not have a magazine safety.

Several variations of the Nambu were made by two private companies, Kayaba Kogyo Kabushiki Kaisha and Tokyo Gasu Denki Kabuşhiki Kaisha (Tokyo Gas and Electric Company, or TGE). The first Kayaba pistols had small-diameter trigger guards. At least 2,250 were made, and most, if not all, had the butt heel cut for the attachment of a wooden telescoping holster stock. Wood-bottomed magazines, rounded triggers, and welded-on lanyard loops were standard. About 500 of these handguns were purchased by Thailand (Siam) shortly before the First World War, and others were sold commercially to such markets as the Japanese community in Mexico, but no official Japanese army orders have been documented.

Second-model Kayaba pistols had a large-diameter trigger guard, designed to admit a gloved finger, plus aluminum-bottomed magazines. There were different retraction grooves on the cocking piece; the triggers were square-surfaced rather than rounded, and the lanyard rings were retained by rings. The milled inset panels on the rear of the frame behind the grip were retained. Serial numbers reached at least 9,300.

Many of the pistols were acquired by army officers, although production was intended for the commercial market.

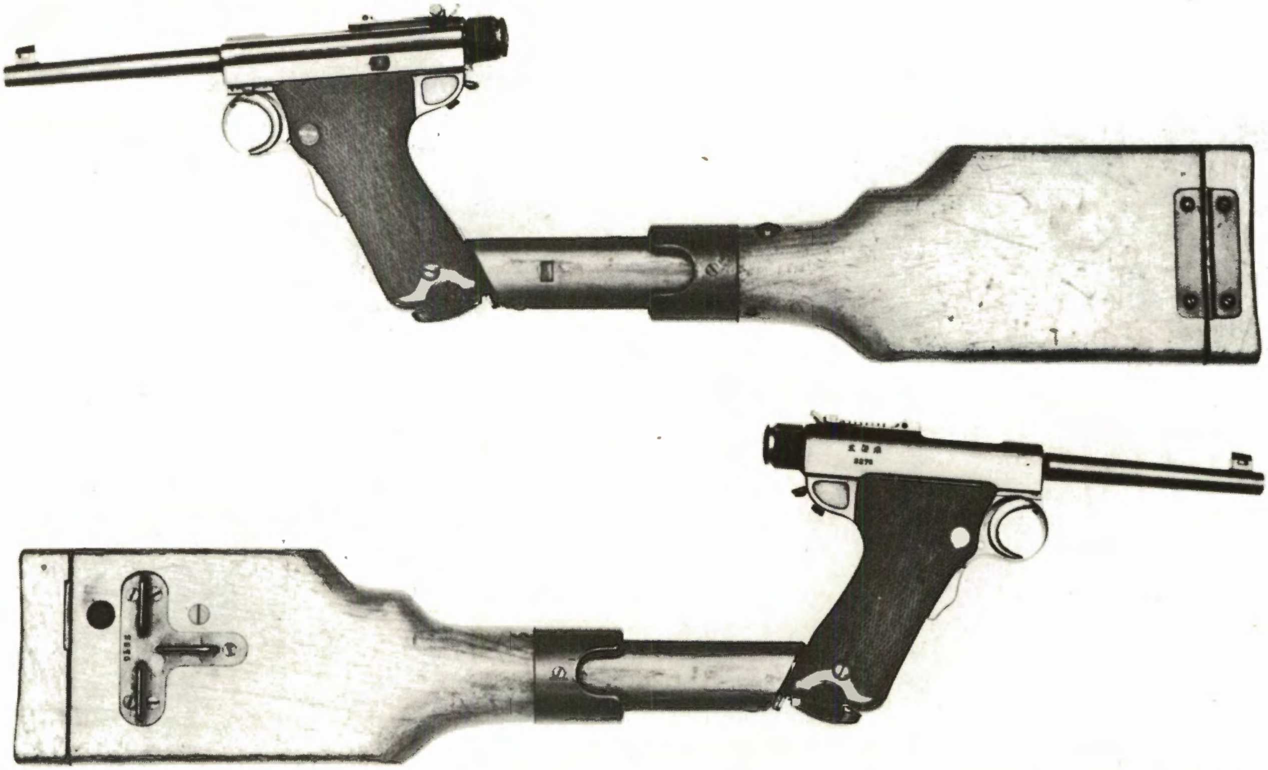


FIGURE 16–4. Two views of the first model 8mm Nambu pistol built by Kayaba Kogyo K.K., ca. 1915. This pistol, serial number 2275, had a 119-millimeter barrel, was 229 millimeters in overall length, weighed 870 grams, and had 6-right rifling. The magazine capacity was 8 shots. *(Visser)*

TABLE 16-1 PRODUCTION OF NAMBU PISTOLS

Type	*Model*	*Total Production*
Type 4	**1st Model Kayaba (small-diameter trigger guard, ca. 1909–1915)**	**ca. 2,275**
Type 4	**2d Model Kayaba (large-diameter trigger guard, ca. 1915)**	**9,300**
Type 4	**1st Model Tokyo Gas and Electric**	**1,500**
Type 4	**2d Model Tokyo Gas & Electric (no stock slot)**	**3,250**
Baby Nambu		**6,500**

Army officers, however, purchased them privately and even encouraged their official adoption. These privately acquired pistols were probably inspected by the army before they were approved for active service, which would account for those bearing the four-circle mark of Tokyo Arsenal. (The arsenal mark was generally above the chamber, but occasionally on the right rear of the receiver.)

Production of the Nambu pistol seems to have moved from Kayaba to Tokyo Gasu Denki during the First World War in about 1915, but it seems likely that the same set of basic machinery may have been used at both locations. The Great Kanto Plain earthquake of 1923 destroyed both machinery and records. The chamber mark of the Tokyo Gasu Denki was GTE in a circle, with the "T" being dominant. Even though the manufacturer's monogram was in Roman letters rather than Japanese characters, it seems doubtful that the pistols were ever exported to an English-speaking country. Like many other firms in Japan, the company probably changed its entire name into English to acquire a set of initials; in this case, TGE for Tokyo Gas and Electric. Japanese serial numbers were invariably in Arabic numbers (at least after about 1900).

The TGE models are similar to the second model, or large-diameter trigger guard Kayaba type; however, the TGE guns lacked the milled-out frame panels. The first 1,500 were made with a stock slot on the butt heel, but many of these slots were filled in when the Japanese navy decided that stocks were not necessary. While the second model TGE pistol had no slot and slightly different rear-frame contours, it was otherwise identical to the first model. At least 3,250 of these were made.

Both Kayaba and TGE weapons of this type bear a curious selection of markings. Despite the official-looking ideographs (which stood for *Nambu shiki*—Nambu Type) on the right side of all frames and the symbol for *Rikugun shiki* (Army Type) on the left side of many, there is no evidence that any were officially purchased by the Japanese army. The *Army Type* frame marking could have been simply a sales gimmick.

The Nambu pistol had its good and bad design features. Its excellent trigger system (with a very smooth and light pull), its balance and accuracy, and the quality of its steel and finish

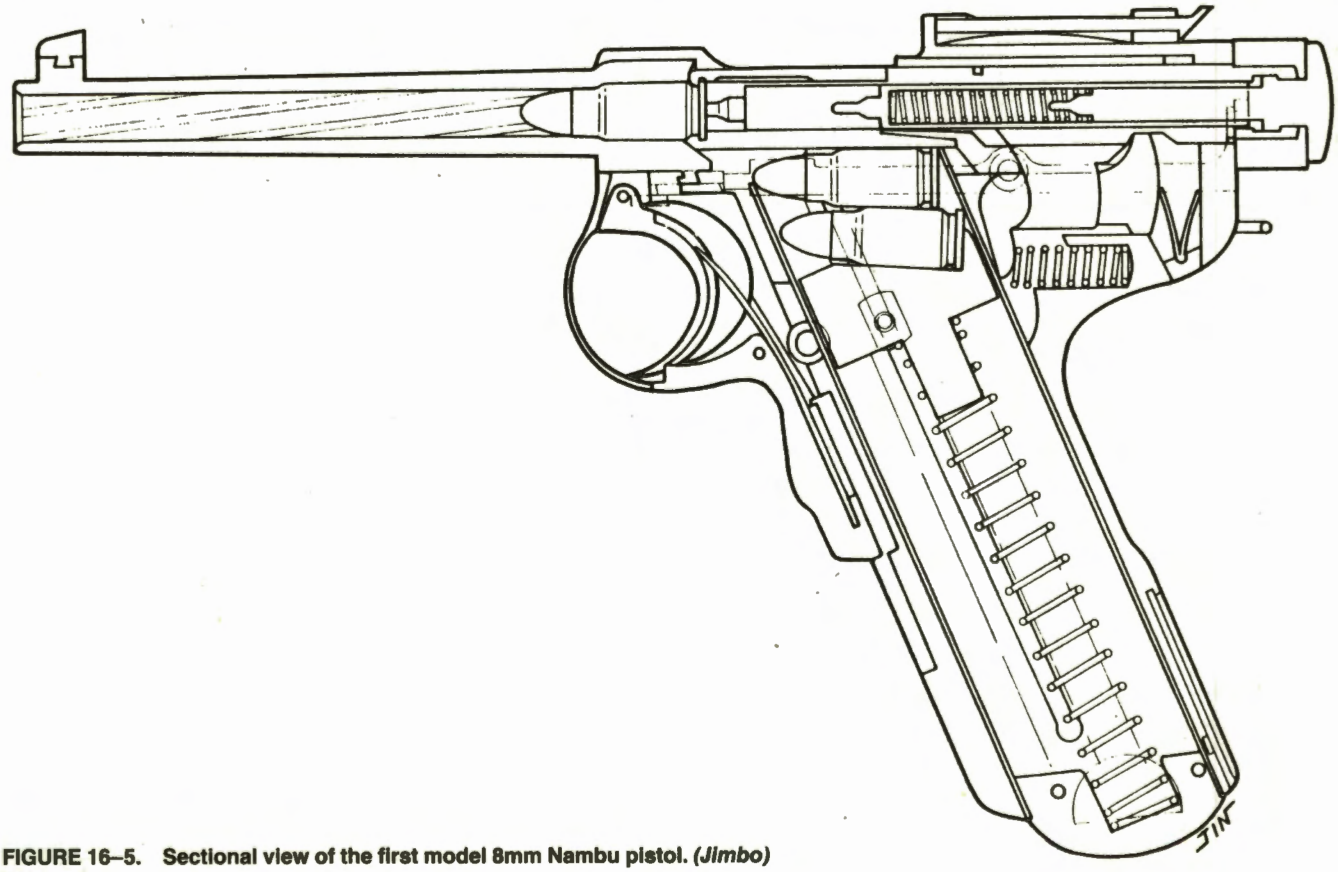


FIGURE 16–5. Sectional view of the first model 8mm Nambu pistol. *(Jimbo)*

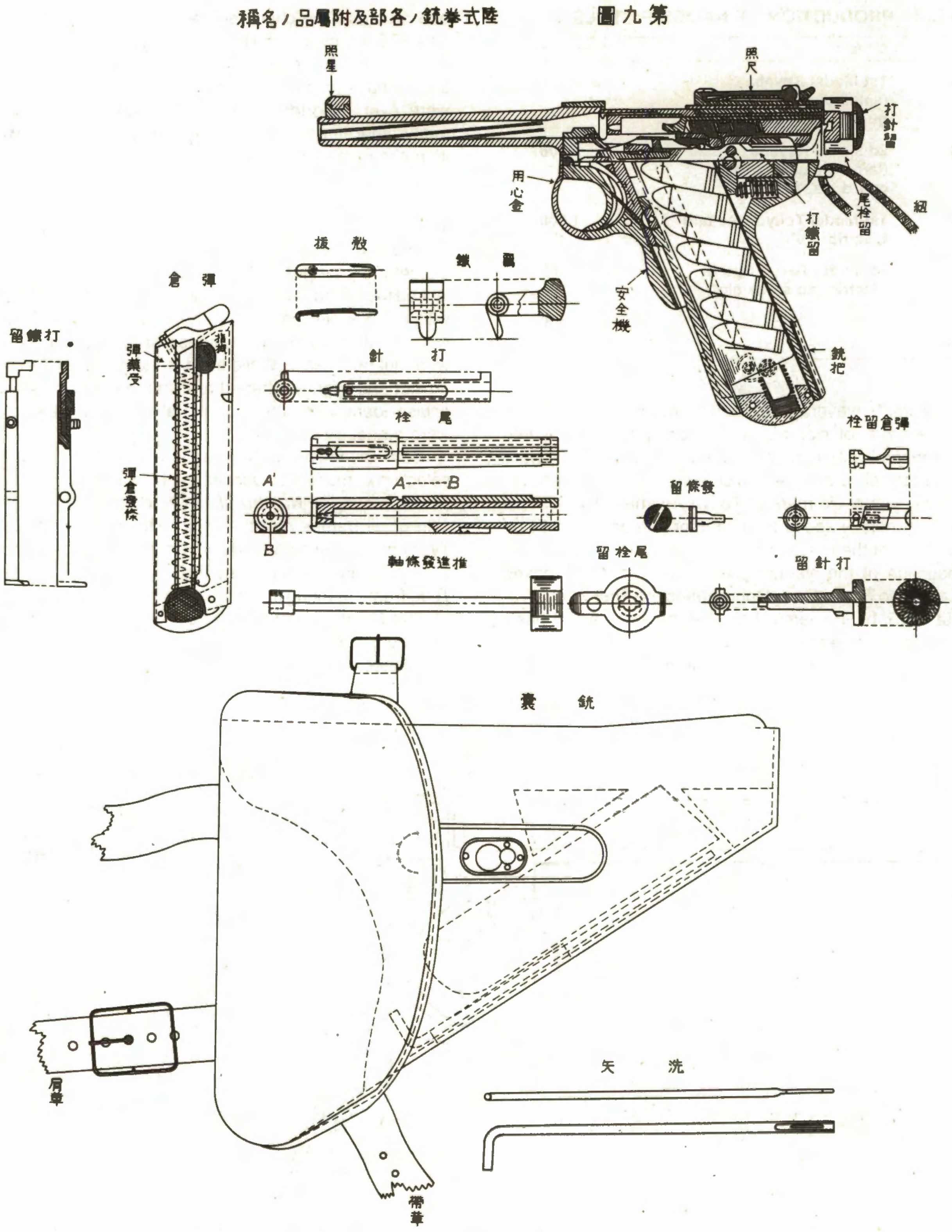


FIGURE 16–6. A print from an early officer's manual illustrating the early type 1904 Nambu pistol, holster, and cleaning rods. ***(Japanese manual)***

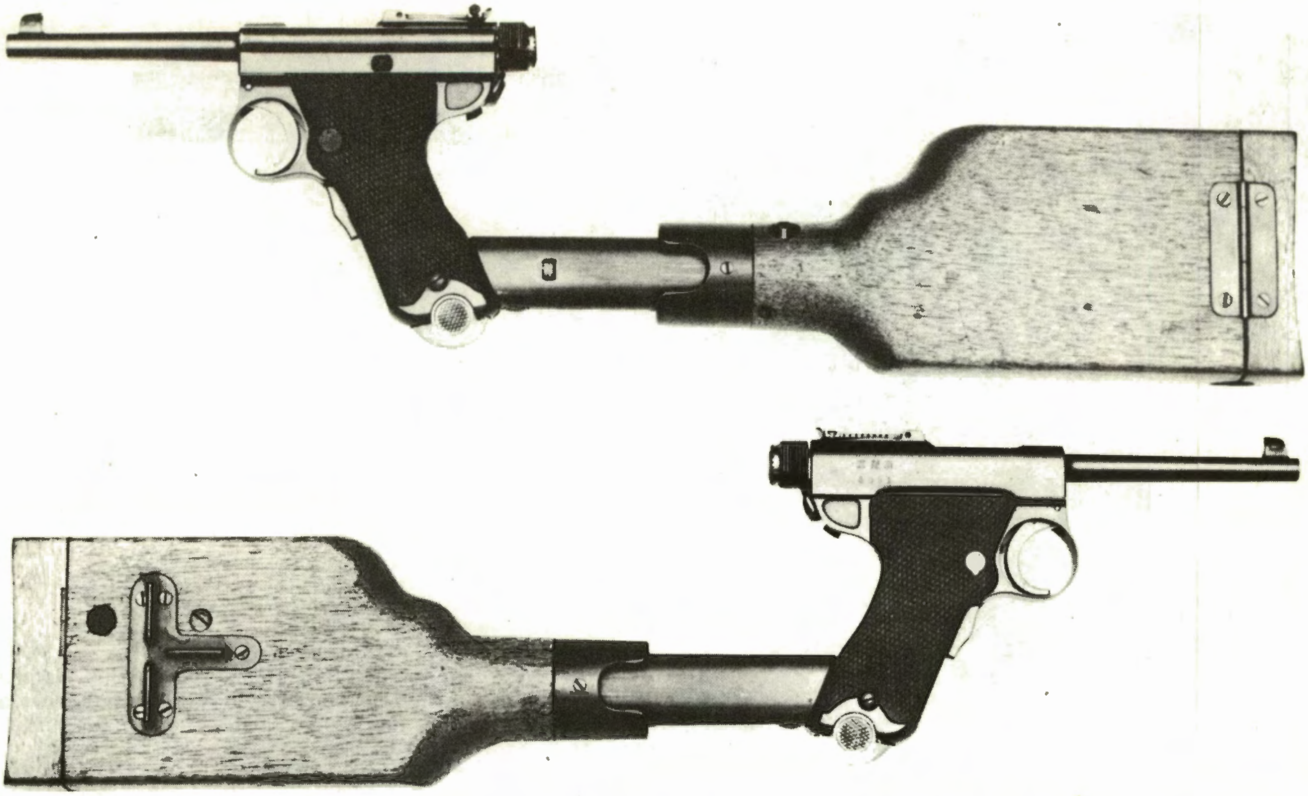


FIGURE 16–7. The second model 8mm Nambu pistol built by Kayaba Kogyo K.K., ca. 1915. Note the large-diameter trigger guard and the aluminum magazine base. *(Visser)*

were among its better characteristics. The manual safety —the lever that blocked the trigger—was scarcely adequate. The steel of the striker spring rapidly weakened in service, resulting in a high percentage of misfires. In fact, pockets in the service holsters were designed for holding spare striker springs. Author R. K. Wilson said the following about the Nambu:

> The chief drawback of this pistol (apart from its light bullet) appears . . . to be in the unreliability either of the striker mechanism or the ammunition. It was found on a short and rather hurried test in the field, that with one particular example . . . misfires occurred in the rough proportion of 1 to 3 rounds put through the pistol; quite clearly dangerously, if not fatally, high for combat conditions. These misfired primers had in every instance been somewhat lightly struck.

To some critics the potential danger that lay in the weak striker spring—a misfire that left the user vulnerable—negated the design's more positive features. It also made the Nambu an undesirable combat weapon. Most new guns of this design whose springs had not been subjected to years of service operated satisfactorily, but many others did not. The complicated tangent rear sight, graduated from 100 to 500 meters, was also not suitable for a service handgun, whose effective range was about 50 meters. However, many early Nambu pistols were still being carried during the Second World War by high-ranking officers who had purchased them during the first war and preferred them over the less aesthetically attractive Taisho Type 14s.

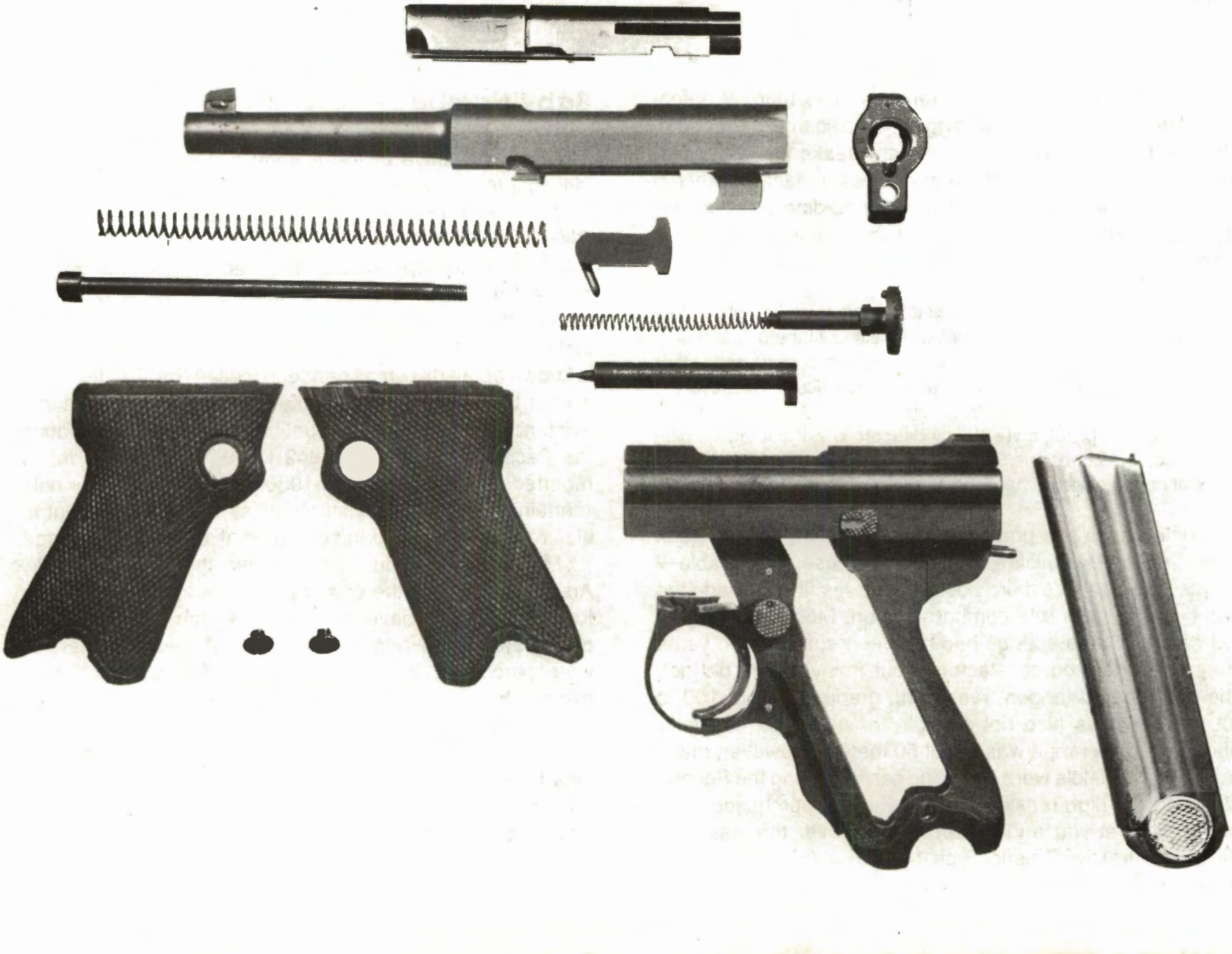
Baby Nambu

This tiny derivative of the Nambu pistol was mechanically identical to the standard 8mm Nambu, although the size of its parts was reduced. This design was known as *Nambu Shiki Jido Kenju "Otsu,"* or Nambu Automatic Pistol Type B. It was recoil operated and locked by a propped-up lug beneath the bolt. Its sear bar had the plunger-type disconnector. Its size, plain-bordered grips, and fixed-notch rear sight were the Baby Nambu's most distinctive features. Little is known about this small handgun (called *Baby* to distinguish it from the larger design, sometimes called *Papa*), and its existence was only rumored until some were captured during the Pacific campaigns of 1942 to 1945. Julian S. Hatcher reported its existence in the 1930s, but as one author noted "certain quarters openly laughed" at the idea. Most authorities refused to believe in such a small pistol and cartridge.[3]

Most Baby Nambu pistols carried the four-circle Tokyo Arsenal mark over the chamber. The production machinery for this gun may have been moved from Kayaba to TGE during the First World War. Many of these small weapons were purchased by Japanese army officers (which would explain the arsenal mark), since most of these men had no need for large-caliber combat weapons, but the Baby Nambu gave them some means for personal defense. Many examples have survived in good condition, some bearing presentation inscriptions. Most seem to have been hand-finished and were made from good quality materials.

The 7mm Baby Nambu fired a small version of the bot-

FIGURE 16–8. Two views of the 7mm *Baby* Nambu pistol. This example, serial number 4127, had an 83-millimeter barrel, was 171 millimeters in overall length, weighed 645 grams, and had 6-right rifling. The magazine held 7 shots. *(Krcma)*



tleneck 8mm service cartridge. Its jacketed lead-core bullet weighed a mere 3.65 grams and attained a muzzle velocity of about 320 meters per second. Its muzzle velocity was considerably greater than the notoriously ineffective 6.35mm ACP, and the Nambu could inflict a fatal wound at close range. This power made a locked breech totally unnecessary, so the pistol could have been made as a cheaper and simpler blowback.

TAISHO TYPE 14 PISTOL

By the early 1920s, Japanese military personnel were looking for a self-loading pistol to adopt as an official weapon, but the Nambu was too expensive and too complicated to be issued in large quantities. The destruction of the original Nambu production equipment in the 1923 earthquake gave the government an opportunity to start fresh. Japan's new pistol was developed in Kokura Arsenal by a commission, and it is assumed that Kijiro Nambu was directly involved as the original design was his. Work on the *Kenju Taisho ju-yon nenshiki,* or Taisho 14th year type pistol, was completed in 1925 (the 14th year of the Taisho era). Initial production was entrusted to the arsenals in Tokyo and Nagoya, with Tokyo tooling up in 1927 and Nagoya about a year later.

The design commission took the original Nambu and simplified its mechanism, but because the board's members lacked experience with handgun manufacture the result was less efficient and more complicated than it should have been. The Nambu frame was simplified, bridging the receiver only at the rear where it carried the V-notched rear sight. The separate bolt return spring chamber was eliminated. The barrel and barrel extension were still forged and machined in a single piece, and the assembly reciprocated within the frame until its travel was stopped by a vertical blade on the trigger subgroup. The bolt was then separated from the propped-up locking block and ran back alone within the receiver. The two coil springs in channels, one on each side of the bolt, controlled the recoil. A separate spring was provided to return the bolt to the locked position. The locking piece, a separate propped-up block in the rear of the receiver, was improved—its shaft had a circular tip that passed between the sides of the forked bolt extension. In the original Nambu, a hollow locking block engaged the solid receiver block. The fit of the Type 14 parts was much less critical, permitting quicker and easier production.

The tail of the striker protruded below the bolt (instead of from the left side), and the sear and disconnector system was also modified. Engineers replaced the old spring-loaded disconnector plunger on the tip of the Nambu sear bar with a lug on the trigger, which acted in conjunction with the receiver stop-lug to prevent the trigger from connecting with the sear until the pistol had been reloaded and the trigger released. The spring-loaded sear was a simple bar with its tip bent 90 degrees to allow it to pass under the bolt and engage the striker; it was raised by a projection on the trigger. A light trigger pull was the result. There was no mechanical safety in the trigger unit, and the disconnector only ensured that the trigger and sear bar did not mesh during the reloading cycle. The striker could be jarred out of engagement with the sear bar by the shock of the bolt hitting the breech, but this could happen only if the sear-to-striker contact was insufficient.

The old grip safety that had blocked the trigger was replaced by a multi-purpose lever safety on the left side of the frame above the trigger. Pushed upward and forward through 180 degrees, the lever allowed the gun to be fired; rotated backward, it locked the barrel and the barrel extension and prevented the sear from moving vertically. By rotating the lever downward, having first removed the left grip, the catch could be removed and the barrel extension run forward from the frame as soon as the trigger subgroup (locked by the safety lever spindle) was slid downward and the retraction grip was unscrewed from the bolt. The safety was efficient and effective, but it could be operated only with the user's other hand. Better designs, such as the German Parabellum, could be operated by the fingers of the gun hand without moving the index finger from the trigger—and with very little disturbance of aim. A horizontally pivoted block in the top front of the magazine well served as the Type 14's magazine safety. The nose of the block tilted into the well when the magazine was removed, and the tail of the block intercepted the trigger so that the gun could not be fired. When the magazine was inserted and fully seated, it rotated the block and disengaged the block tail from the trigger.

A spring-loaded cross bolt behind the trigger on the left side of the frame held the magazine of the Type 14 pistol in place. Pistols made after mid-1940, several months after the enlarged trigger guard appeared, have an auxiliary magazine spring low on the front grip, in addition to the standard cross bolt, to retain the magazine and ensure the operation of the magazine follower. Magazines made after 1940 had a special aperture in the front of the body to retain the magazine follower in its lowest position. The depressor button was simply pushed down and slightly forward to lock under the notch, disconnecting the follower spring from the loading process and allowing the cartridges to be dropped into the magazine. The absence of a bolt hold-open device on the Type 14 pistol has been criticized by many experts because it made the weapon more difficult to reload.

The earliest production models of the Type 14 pistol were made of acceptable grades of steel and were reasonably well finished, but quality control was such that parts were seldom interchangeable. Components were apparently turned out quickly, and they were hand finished and fitted. By American or European standards, the production process was slow and labor intensive.

Production of the Type 14 pistol began in the army's Nagoya Arsenal early in 1927 and in Tokyo in February and March of 1928. The guns were much more angular and less attractive than their Nambu predecessors, although the substitution of two internal coil mainsprings had eliminated the asymmetric spring housing on the left side of the Nambu frames. The first Type 14 pistols had a retraction knob made of three separate, circular-milled flanges, small trigger guards, and no auxiliary magazine retaining springs. Standard markings included those around the safety catch and the designation *Ju-yon nen shiki* (14th-year-type) on the left rear of the frame. The serial number prefixed by the arsenal stamp was on the right rear of the frame, and the frame panel behind the grip bore the date of manufacture. (For example, 12.7 was the seventh month of the twelfth year of the Showa

FIGURE 16–9. An 8mm Type 14 pistol manufactured at Chuo Kogyo K.K. works in February 1936 (2nd month, 11th year of the Showa era), serial number 16,297. The markings on the left side of the pistol read, *left to right*, "fire," "safe," and "Ju-yon nen shiki," or 14th year type (Type 14). *(Visser)*

FIGURE 16–10. Type 14 Nagoya Army Arsenal pistol produced in October 1944 (10th month of the 19th year of the Showa era), serial number [1]59,574. This pistol had a 119-millimeter barrel, was 229 millimeters in overall length, weighed 896 grams, and had 6-right rifling. The magazine held 8 shots. *(Krcma)*

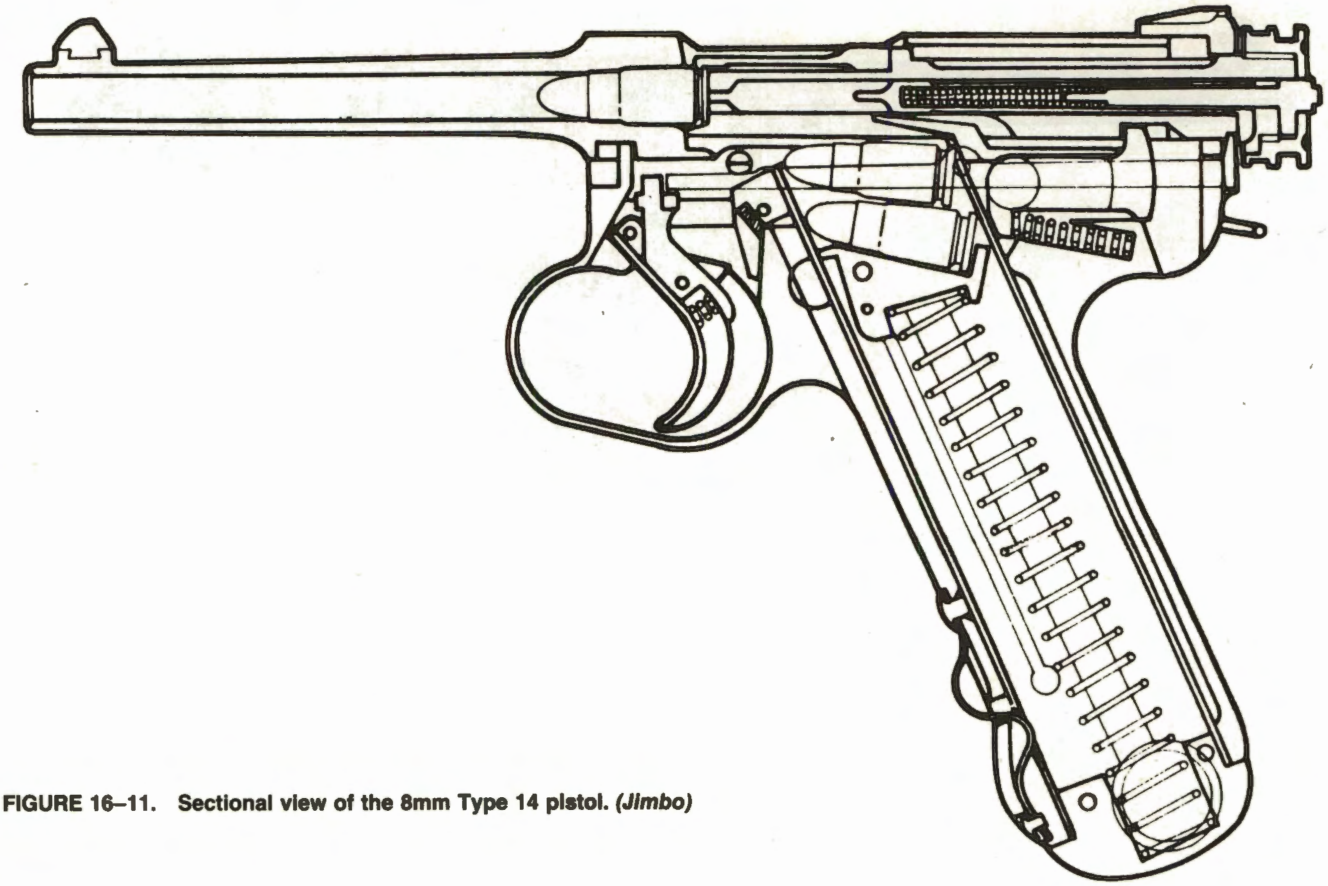


FIGURE 16–11. Sectional view of the 8mm Type 14 pistol. ***(Jimbo)***

era—July 1937; the character indicating the Showa reign often appeared in conjunction with the date.)

Attempts to estimate the number of Type 14 pistols produced have been complicated by the loss of production records during World War II bombing raids. All estimates, therefore, are based on extrapolations from serial numbers found on Type 14 pistols.[4] George Markham identified three basic manufacturers: Kokura Arsenal, Nagoya Arsenal, and the private firm Chuo Kogyo K.K.

The Kokura Arsenal on the southern island of Kyushu was established after the great earthquake of 1923, which destroyed the arsenal in Tokyo. Kokura appears to have produced between 25,000 and 27,000 pistols between 1928 and either 1933 or 1936, and used the Tokyo mark on its weapons. Markham identified the former date as the cutoff, since the production tooling was supposedly transferred from Kokura to the Nambu-Seisakusho factory in Tokyo-Kitatama in mid-1933. It is possible that the Nambu staff continued to mark their Type 14 pistols with the Tokyo-Kokura markings, as had Kokura (Mauser, too, marked their Parabellums with the DWM logo for many years; see chapter 4). However, January 1934 is the earliest date found for a Nambu-Seisakusho-made pistol, so there is reason to doubt this speculation. Nambu-Seisakusho was renamed Chuo Kogyo Kabushiki Kaisha in 1936 when it merged with Taisei Kogyo K.K. The Nagoya Arsenal began production in 1927 and terminated it by 1932.

When the Sino-Japanese conflict broadened into war in 1937, production of all small arms was increased. About 11,000 Type 14s were manufactured between March 1936 and March 1937; by March 1938, 26,000 more had been turned out. No major changes were made to the basic design until winter experiences in Manchuria indicated that the Type 14 was difficult to shoot while wearing gloves. In about November 1939, Chuo Kogyo K.K. introduced a version with an enlarged trigger guard. In addition, two mechanical changes were made in mid-1940. First, an auxiliary magazine spring was added to the front grip. And second, the length of the striker was reduced from 75 to 65 millimeters. The short new pattern striker required the locking piece lug to be cut longitudinally to allow its passage. The result was a longer striker fall and hence a longer lock time. This was intended to counteract weak strikes caused by spring wear and low-sensitivity primers. But it was only part of the answer to a serious problem. (The strength of the striker spring should have been reconsidered, as well.)

The addition of the larger trigger guard also improved the pistol's aesthetic appeal. The small guard had always looked too cramped, and its rounded contours were at variance with what was basically a very angular design. United States troops first captured Type 14s with the enlarged trigger guards in the Aleutian Islands, and they have since become widely known among Americans as the *Kiska Model.*

Markham suggests that Chuo Kogyo K.K. reached serial number 99,999 for their Type 14 pistols in about October 1941. Then the company apparently began to number their pistols starting from serial number 1 again, adding a calendar sign prefix to designate this new series. In the west, this

system and the reason for it has puzzled experts for years who have been trying to identify quantities and locations associated with Type 14 production. Until mid-1944, the Chuo Kogyo K.K. Type 14s were marked with the calendar symbol, which resembled the letter *Y* lying on its side inside a circle. In about 1944, the Chuo Kogyo K.K. factory shifted its production interest to the Type 94 pistol, described below. Table 16–2 summarizes the production at Chuo Kogyo, but these figures still represent little more than a good guess.

The production history of the Type 14 at the Toriimatsu plant at Nagoya Arsenal, which was also responsible for accepting and inspecting the pistols made by Chuo Kogyo, is even less clear. As has already been explained, manufacture of the Type 14 pistol at Nagoya, which began in early 1927,

TABLE 16-2 TYPE 14 AND TYPE 94 PISTOL PRODUCTION, CHUO KOGYO K.K.

Year	*Total Production Type 14*	*Total Production Type 94*
1927–1938	**ca. 56,800**	
1937–1938		**ca. 6,750**
1939	**16,138**	**3,607**
1940	**15,002**	**5,280**
1941	**16,773**	**8,107**
1942	**8,156**	**7,325**
1943	**7,156**	**15,585**
1944	**1,953**	**18,842**
1945		**6,593**
Total	**122,000**	**72,100**

1. Front sight
2. Barrel and barrel extension
3. Extractor
4. Bolt
5. Trigger
6. Trigger sear
7. Trigger sear pin
8. Sear spring
9. Trigger guard assembly
10. Trigger pin
11. Frame
12. Safety catch
13. Magazine safety pin
14. Magazine catch
15. Magazine catch spring
16. Trigger bar
17. Trigger bar spring
18. Magazine
19. Trigger bar pin
20. Magazine safety
21. Magazine safety plunger
22. Magazine safety spring
23. Firing pin extension
24. Firing pin spring
25. Firing pin
26. Cocking piece
27. Locking block spring
28. Locking block
29. Recoil spring
30. Grip plates
31. Grip plate screws

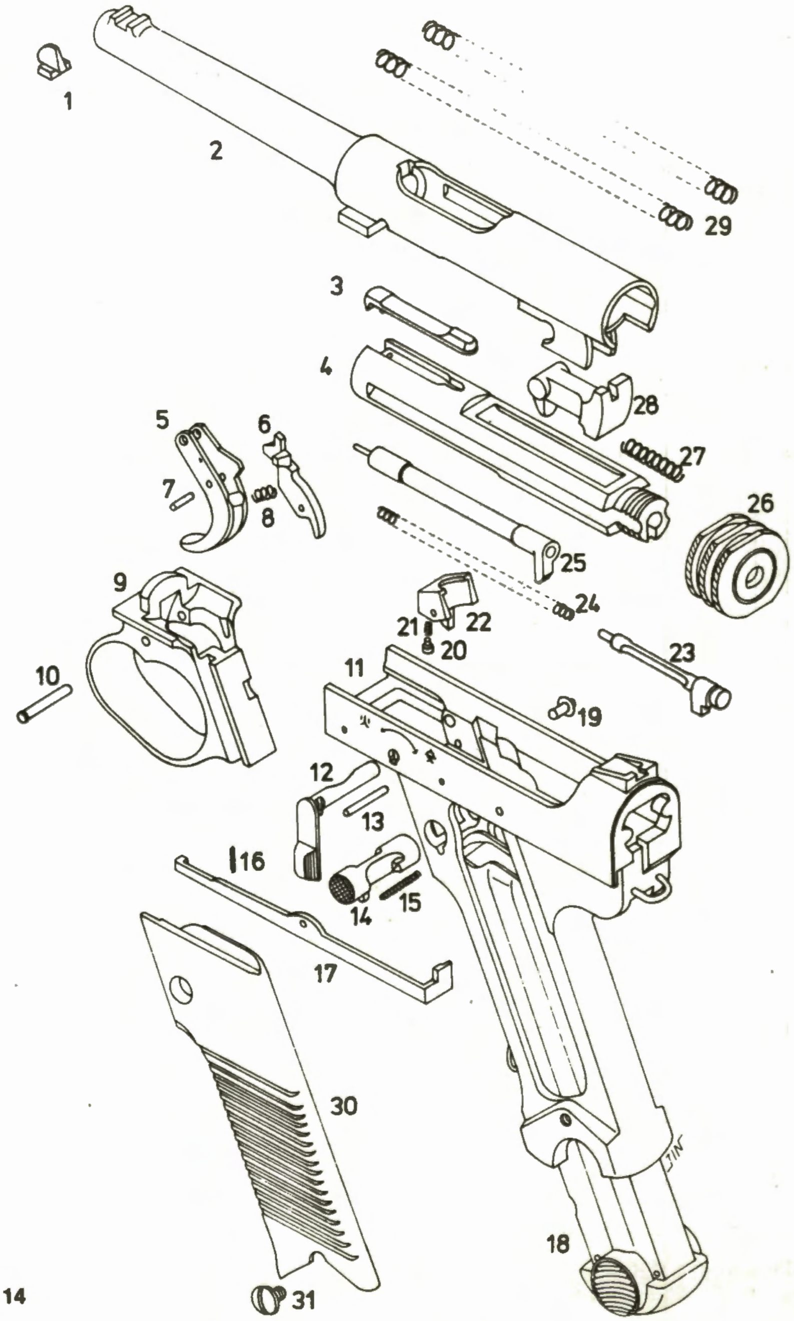


FIGURE 16–12. Disassembled view of the 8mm Type 14 pistol. *(Jimbo)*

must have been terminated in 1932. However, production was resumed there during the war years, probably starting in mid-1940. The lowest serial number known is 41,003 of May 1942, with a calendar prefix. Whether the calendar sign indicated that the no-suffix 1 to 99,999 block had already been completed is not clear; it may have been added to distinguish wartime and prewar production. This conjecture seems to be a relatively safe one, as published Japanese accounts indicate that the Nagoya Toriimatsu factory could manufacture about 20,000 Type 14 pistols per month. The Nagoya-Toriimatsu works must have reached number 99,999 in November 1943 and then began a new series with a new calendar sign prefix, a small square in a circle. Production continued until mid-1945. The second series ended somewhere around serial number 72,028. Toward the end of the production period, the factory was turning out very crude versions of the Type 14, with as many processes and parts simplified as possible to permit increased manufacture. One possible set of total production figures for the Type 14 at all locations is presented in table 16–3. Given the uncertainties involved in the analysis of Japanese handgun production, it is quite possible that as many as 400,000 Type 14 pistols may have been made.

It is generally agreed that the Type 14 was not a very good military handgun. It had a number of design shortcomings, notably a weak striker mechanism, a magazine safety of questionable value, a magazine that was difficult to remove, and no bolt hold-open device. These shortcomings were bad enough, but the pistol also was designed to fire a relatively low-powered cartridge. And last in the bill of particulars indicting the Type 14 was the poor quality of wartime models. R. K. Wilson, author of the prewar *Textbook of Automatic Pistols,* had an opportunity to test some Japanese handguns while he was stationed in Borneo in 1945. He reported on tests with three Type 14s and two original Nambus.

> All these pistols were in poor condition; they were battered, rusty and had presumably seen much service. Ammunition . . . was obtained from an apparently untouched store, but it was later discovered . . . that this ammunition had been made in 1941 [and] it was impossible to say how long it had been in store in the tropics. In this distinctly unscientific series of experiments, a total of 148 rounds were fired from two examples of the Year 14 and one example of the Nambu.
>
> Test 1
>
> Undertaken with Year 14 pistol, number 86536
>
> | | |
> |---|---|
> | Rounds fired | 64 |
> | Functioned correctly | 46 |
> | Misfires | 17 |
> | Failure to feed | 1 |
>
> The test was abandoned after four consecutive misfires.
>
> Test 2
>
> The same pistol number 86536 was used, but the striker spring was changed; as no new springs were available, a spring was taken from another pistol.
>
> | | |
> |---|---|
> | Rounds fired | 10 |
> | Functioned correctly | 10 |
> | Misfires | 0 |
>
> Test 3
>
> Undertaken with Year 14 pistol, number 113846 [?]
>
> | | |
> |---|---|
> | Rounds fired | 33 |
> | Misfires from Test 1 | 17 |
> | Functioned correctly | 12 |
> | Misfired again | 5 |
> | Fresh rounds | 16 |
> | Functioned correctly | 12 |
> | Misfired | 4 |
>
> Test 4
>
> Undertaken with a Nambu pistol, number 9265
>
> | | |
> |---|---|
> | Rounds fired | 40 |
> | Functioned correctly | 36 |
> | Misfires | 4 |
>
> It can only be said that the results of these tests were inconclusive, due chiefly to their rough nature and the fact that the ammunition employed could not be relied upon. However, it seems reasonable to suggest that Test 1 demonstrated a weak and rapidly firing spring, possibly of poor quality in the first place, and that from the limited data obtained the Nambu behaved better than the Year 14.[5]

TABLE 16-3 APPROXIMATE TOTAL PRODUCTION OF THE TYPE 14 PISTOL

Place of Manufacture	*When Manufactured*	*Approximate Total*
Tokyo Army Arsenal	**ca. Feb. 1928–ca. 1933–1936**	**27,000+**
Nagoya Army Arsenal, Toriimatsu Factory	**Jan. 1932–ca. late 1932**	**8,000**
Nagoya Army Arsenal, Toriimatsu Factory (First, or "A" Series)	**ca. mid-1940–ca. Nov. 1943**	**100,000**
Nagoya Army Arsenal, Toriimatsu Factory (Second, or "B" Series)	**ca. Nov. 1943–ca. June–July 1945**	**72,000+**
Chuo Kogyo K.K.	**ca. Oct. 1941–ca. mid-1944**	**22,000+**
Total		**329,000+**

Even allowing for the deterioration in the cartridges—and the quality of Japanese propellants was often poor—Wilson's tests clearly show some of the problems that confronted the soldiers to whom the guns were issued.

16-shot Experimental Pistol

An experimental pistol that combined features of the original Nambu pistol and the Type 14 was found after the war. Among its unique characteristics was a 16-shot magazine. Slightly more than a dozen of these pistols were made. Its mechanism was similar to that of the standard Nambu; it operated by short recoil and locked by a propped-up block in the frame beneath the receiver, which engaged a recess cut in the bolt. It used the old-style locking block through which the receiver lug passed; its concave-ground face formed the block pivot. The Type 14 pistol had the shaft of its locking block riding between the two tangs of the fork-shaped lug on the barrel extension. The firing pin-striker was also more like that of the old Nambu than the Type 14. The massive frame was closed only at the rear, where the bridge formed the base for the tangent leaf rear sight. Twin recoil springs were used, one in a channel on each side of the bolt where it bore against a crossbar through the rear of the frame. The left side mainspring also served as the spring for the striker, whose nose was offset to the center of the bolt. The striker was pinned and plugged in the front of the spring—an ingenious idea to ensure that the spring was powerful enough to guarantee ignition of the cartridge's primer and to overcome the tendency for faulty ignition as with the original Nambu and the Type 14. Details of the trigger, although basically similar to the Type 14, were changed, and the safety lever was moved closer to the trigger aperture. The safety lever spindle locked the trigger guard in place. The magazine catch was moved to the lower front of the pistol's grip. Apart from the detail differences in trigger and sear, the action was virtually that of the Type 14, but the frame machining was completely different. The result bore a vague resemblance to the Parabellum and the Finnish Lahti, largely because of the angle of the grip.

This experimental handgun was quite a handful. It weighed 1,300 grams, compared to the Type 14's 896 grams. It had a 135-millimeter barrel; the Type 14's barrel measured 119 millimeters; total lengths were 275 and 229 millimeters respectively. Being that heavy and utilizing such a low-power cartridge, it was probably a pleasant weapon to shoot. It is likely that this handgun came from the Chuo Kogyo K.K. Kitakama factory in the mid- to late-1930s and that it was engineered at about the same time as the Type 94 pistol, a less expensive alternative to the Type 14.

TYPE 94 PISTOL

The *94 Shiki Kenju* (Type 94 Pistol) was introduced in 1934, the ninth year of the Showa era.* The Type 94 probably was manufactured exclusively at the Nambu-Seisakusho K.K. factory (Chuo Kogyo K.K. after 1936) in Kitakama-Tokyo. Design studies were completed by 1934, and the pistol was marketed commercially to military personnel as the *Self-acting Pistol, Type B* in the three years preceding the start of the Sino-Japanese war.† Once the war began, there was an increased demand for this handgun because it was smaller and lighter than the Type 14 (see table 16–4). Air crewmen and armored vehicle personnel especially found it handy to carry in situations where space was premium. By the war's end, about 72,000 of these handguns had been manufactured.

The Type 94 pistol had a completely different operating mechanism. In concept, the rising block-type locking system was quite similar to that employed in the early locked-breech versions of the Spanish Campo-Giro pistols (see chapter 13). The locking block floated independently between two lugs under the chamber end of the barrel. This locking piece was controlled by cam slots cut into the frame, and it locked into a transverse notch machined across the underside of the slide. When the pistol was fired, the barrel and slide assembly recoiled through 2.5 to 3 millimeters before the locking block began its downward movement. After an additional 2.5 to 3 millimeters of movement by the barrel and slide together, the lug struck the frame in front of the trigger unit and the barrel was halted. The slide was then free to complete its rearward travel. Between the slide and the barrel, the mainspring was compressed until it could be compressed no further. At that point, the stored energy in the compressed spring powered the return of the slide, with the loading and locking of the pistol following in sequence.

The Type 94 had several unusual design features, some of which were unsatisfactory. First, the long sear bar running along the left side of the gun in a channel in the frame was a potential safety hazard. The sear bar converted the rearward pull on the trigger to a lateral movement that freed the hammer at the rear of the gun. This bar could be accidentally or intentionally depressed from the outside, discharging the gun without pulling the trigger. This possibility negated the worth of the manual safety and the magazine disconnector safety. Second, the designers did not include a slide hold-open device on this pistol, which meant that it was just as difficult to reload as the Type 14 had been. Despite their mistakes, the designer of the Type 94 did eliminate some of the bad features of the Type 14. The latter's suspect striker mechanism was replaced by a powerful internal hammer, so the Type 94 rarely suffered the misfires that had often characterized its predecessor. The manual and trigger safeties were much better than those of the Type 14, but new drawbacks negated each improvement. Theoretically the locking system of the Type 94 was efficient, but the poor quality of pistols made late in the war caused numerous accidents. Guns often fired before they were fully locked or when the lock had worn or jammed. The action was consequently transformed into a simple blowback and damage to parts ensued. Although this type of malfunction was rare, it was not the type of failure that should have been allowed. Compared with the Type 14, the Type 94 had a better ignition system, in which the hammer replaced a striker, but its trigger and sear unit

*The Japanese determined this weapon's designation by calculating the time passed since the reign of the first emperor, according to the Jummu nengo calendar, which made 1934 the year 2594.

†It is generally believed that General Kijiro Nambu was not involved with the design of this pistol, even though the work was done by his firm.

FIGURE 16–13. Three views of the 8mm Type 94 Japanese pistol. *Top:* This pistol bears serial number 4636 and was built in March 1938 (3rd month of the 13th year of the Showa era) at the Chuo Kogyo K.K. *Middle:* Pistol number 36,588 also was manufactured at Chuo Kogyo in May 1943 (5th month of the 18th year of the Showa era). *Bottom:* Left side of number 36,588. The characters above the trigger read *Kuyon shiki*, or Type 94. *(Krcma and Visser)*

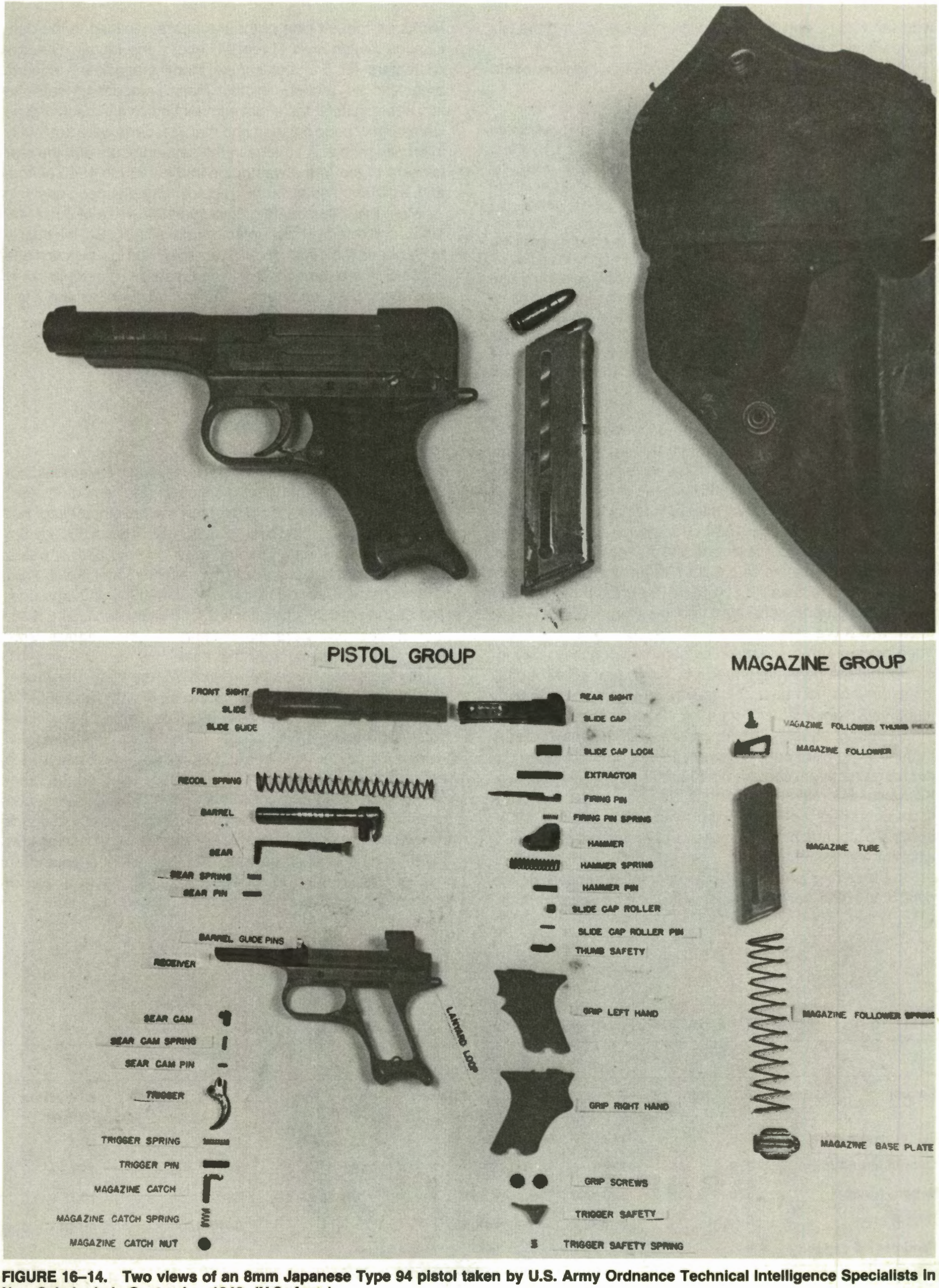


FIGURE 16–14. Two views of an 8mm Japanese Type 94 pistol taken by U.S. Army Ordnance Technical Intelligence Specialists in New Caledonia in September 1943. *(U.S. Army)*

was far worse, and the magazine capacity of a mere six rounds was inadequate.

Lieutenant Colonel R. K. Wilson evaluated the work of the Type 94's designers:

> The designers of the Model 94 clearly set out to . . . eliminate the most unsatisfactory features of the Year 14. . . . They were, in order of importance, (i) Difficulty of reloading or magazine changing, (ii) Unreliability due to weakness of the striker mechanism, (iii) Difficulty in operating the applied safety device, (iv) Liability of ingress of foreign matter to the action. If success attended the designers' efforts here, in exchange they gave the Model 94 a serious degree of unreliability in function and a risk in operational handling . . . the design of the Model 94 is sound with the exception of the firing mechanism. If considered as an intermediate or pocket weapon on account of its size and weight, it . . . falls short in comparison with most of its contemporaries in that class. The best that can be said of it is that, from limited interrogation, it was considered . . . preferable to the Nambu and the Year 14 as an operational weapon.[6]

The production history of the Type 94 is also something of a mystery, again due largely to the bombing raids that destroyed the records. The first guns were made by Nambu-Seisakusho K.K. in about 1935, but fewer than 3,000 guns had been made in the Tokyo-Kitakama factory before the war with China began in July 1937. The marks applied to these pistols followed standard practice; the arsenal mark and serial number appear on the rear right side of the frame. Pistols numbered below about 7,500 (mid-1939) have the mark of the Nagoya arsenal separated from the Nambu-Chuo Kogyo mark, which prefixed the serial number group. These separated number groups, applied by separate punches, may indicate that the guns were made in Tokyo and subsequently inspected and accepted at Nagoya. Later guns have the arsenal and manufacturer's marking close together below the date—but not struck with one punch—and this may indicate that the guns were assembled, inspected, and accepted under full government control. Whether this happened in Tokyo-Kitakama or in Nagoya-Toriimatsu is open to debate, but it is believed that the former plant was nationalized in 1939, and the pistol machinery may have been moved to Nagoya, where it was found in 1945.

The date of manufacture (or acceptance) appears on the right rear of the frame together with the Showa reign mark. Marks on the left side of the frame are confined to the designation *Kuyon shiki* (Type 94) above the trigger, plus the characters for *fire* and *safety*. Many magazines, triggers, breechblocks, and some other major components bear the last three digits of the serial number, indicating that the guns were largely hand finished and that vital parts were not totally interchangeable. A change in the sear contours and the rear left side of the frame was made in the 1939 to 1940 period, and a flattened sear bar tail replaced the stepped variety.

Most Type 94s made before mid-1940 were of good materials and displayed acceptable surface finish. But the quality of finish and materials declined steadily. The last pistols made in 1945 were among the worst service handguns ever produced. Their parts fitted poorly, and their surface finish was terrible.

HAMADA PISTOLS

The story of World War II Japanese military pistols would not be complete without a brief mention of the Hamada pistols. In about 1942 a Major Yato oversaw the development of two Browning-derived blowback pistols, which were built by the Hamada Arms Shops. The first model, *Kenju Shiki I,* was a nine-shot blowback pistol, and the second model, *Kenju Shiki II,* was chambered to fire the 8 × 21mm Nambu cartridge. The second model was adopted for military service in 1943, and at least 500 were manufactured at the Nagoya Army Arsenal at Toriimatsu after that date.

In the seventy years between 1875 and 1945, the Japanese military procured probably between 400,000 and 500,000 handguns, if private purchases by officers are included in the count. This was a small number when the size of the Imperial Armed Forces is considered. During the same period, the armed forces of Germany acquired something on the order of 6 million handguns, and the United States military purchased between 3 and 4 million. In relative terms, handguns never became as important an item for the Japanese as they were for other military powers. And this lack of emphasis on handguns may help to explain the questionable quality of most of the revolvers and pistols developed in Japan.

TABLE 16-4 COMPARATIVE DATA FOR JAPANESE MILITARY SELF-LOADING PISTOLS

	Nambu Type 4	*Type 14*	*Experimental Nambu*	*Type 94*	*Hamada Type 1*	*Hamada Type 2*
Caliber	8 × 21mm Nambu	8 × 21mm Nambu	8 × 21mm Nambu	8 × 21mm Nambu	7.65 × 17mm	8 × 21mm Nambu
Barrel length (mm)	119	119	135	96.5	90	94.5
Overall length (mm)	229	229	275	183	165	176.5
Weight (grams)	870–990	890–900	1,300	720–755	650	750
Rifling twist	6-right	6-right	6-right	6-right	6-right	6-right
Feed device capacity	8	8	16	6	9	6

FIGURE 16–15. The first model 7.65mm Browning caliber Hamada pistol, which was derived from the Browning Modèle 1903 and 1910 pistols. This pistol is serial number 2,722. *(Visser)*

FIGURE 16–16. The second model 8 × 21mm Hamada pistol, serial number 215. Note in the serial number that the "5" was struck upside down. *(Visser)*

NOTES

1. Noel Perrin, *Giving up the Gun: Japan's Reversion to the Sword* (Boston: David R. Godine Publisher, 1979).

2. More details on the purchase of Smith & Wesson revolvers can be found in Robert J. Neal and Roy G. Jinks, *Smith & Wesson, 1857–1945*, rev. ed. (South Brunswick, New York, London: A. S. Barnes & Co. and Thomas Yoseloff Ltd., 1975), pp. 175, 177, 181, 183–85, 188–89, 194–95; and Roy Jinks, *History of Smith & Wesson* (North Hollywood, CA: Beinfeld Publishing, Inc., 1977), pp. 76–78, 82, 94–95, 100.

3. Frederick E. Leithe, *Japanese Handguns* (Alhambra, CA: Bordon Publishing Co., 1968).

4. The following sources were used in preparing the section on the Type 14 Pistol, and the reader is referred to these for further information on this interesting but confusing topic: Leithe, *Japanese Handguns;* George Markham, "The Japanese Nambu and 14th Year Type Pistols: Part I—The Nambu Pistols/The 'Baby' Nambu," in *Shooter's Bible, 1977* (Hackensack, NJ: Stoeger Publishing Co., 1976), pp. 55–61; Markham, "The Japanese Nambu and 14th Year Type Pistols: Part II—Taisho 14th Year Type Pistol/Large Magazine Nambu Prototype," in *Shooter's Bible, 1978* (Hackensack, NJ: Stoeger Publishing Co., 1977), pp. 37–46; William Kotrba, Jr., "Nambu Flaws Trimmed in Type 14," *American Rifleman* (July 1973): 54–57; and John C. Van Lund, *Japanese Military Handguns and Holsters, 1893–1945* (Nashville: Blue & Gray Press).

5. Unpublished R. K. Wilson article, "Low Velocity Automatic Arms," cited by Markham in Park II of his series of the Nambu Type 14.

6. Wilson, "Low Velocity Automatic Arms," cited by Markham, "The Japanese Type 94 Pistol," *Shooter's Bible, 1979* (Hackensack, NJ: Stoeger Publishing Co., 1978), pp. 69–75.

17 Handgun in Military Conflicts 1870 to 1945

W. W. Greener, a British gun maker and author of many important books on firearms, wrote a pocket-sized book in October 1914 called *Sharpshooting for War and Defence.* In it, he summarized the feelings of many soldiers when he said, "When one needs a revolver one wants it very badly! That sums up the position of shooting in order to save one's life. Ability to use a weapon in ordinary circumstances is assumed. In moments of unexpected danger the essential thing is to be ready what may happen."[1] In the 75 years from 1870 to the end of World War II, gun designers created a host of military handguns. The proof of their value was performance upon demand in combat situations. In words and photographs, this chapter highlights various instances in which handguns went to war and were used to take and save lives.

Handguns are sobering weapons; more impressive psychologically at close ranges than rifles, many say. When a combat situation is resolved by a handgun, the battle has become an intensely personal struggle. Men are no longer impersonal targets, but adversaries who must be stopped at any cost. However, the handgun's psychological advantage can be realized only in those situations in which both parties recognize the weapon for what it is. Colonel Vincent Fosberry, a veteran of Britain's colonial wars and recipient of the Victoria Cross, the British Empire's highest award for valor, compared the sensibilities of the "civilized" European and the "uncivilized" colonials:

> With the civilized man, who knows to a nicety the locality of his principal organs and something of the effects that the presence of foreign bodies in his interior may be expected to produce, a comparatively slight wound (surgically considered) will often suffice to set him thinking of his spiritual condition or his other personal interests, rather than of the business in which he may be engaged. Thus, a comparatively feeble weapon may often be used against him with good effect. But when we are fighting the Ghasi, the Zulu, or the Arab of the Soudan, the case is very different. Any one of these will make his rush, having his mind fully made up to kill you, or to be killed by you, and one of these two things he will get done without *arrière-pensée* of any kind, and he knows as little about his own inside as a tiger does. As in the case of that beast also, when he makes his attack upon you a personal one, you must be prepared to stop him or die.[2]

American military men had similar experiences when they encountered the Muslim warriors of the Philippines. After United States forces occupied the islands, the Moros continued their centuries-long struggle for freedom from Christian rulers by taking a holy oath against the invaders on the Koran. These *Juramentados* (from the Spanish for oath-taker) were often very difficult adversaries. A young woman, the wife of an American officer stationed in the Moro province, told what it meant to confront a Juramentado. "Last December," she wrote, "a Moro attacked a captain, who fired six .38 caliber shots into him. The Moro didn't stop running for a second; he came right on, cut the captain to pieces with his bolo and started on his way rejoicing, when a guard finally finished him with a .45 caliber bullet."[3]

Major Robert Lee Bullard commented on the performance of the .38 caliber (9mm) Colt Army revolver in the Philippines:

> No better test of our revolver's worth and the fitness of its caliber for the purpose for which a revolver has been provided can be had or ever has been had than in its recent use by our troops fighting in the Moro country. When they fight, Moros fight suddenly in close quarters in the revolver's domain of twenty paces. It is a damning comment on the caliber of the .38 that every officer, man and camp-follower in the regiments which have served against Moros after a first experience laid aside the .38 whenever he could by hook or crook raise a bigger "gun," generally the old [Colt Single-Action] .45. Indeed a department commander, who by constant personal part with troops in the field knew the need, provided and issued to officers and men as many as he could get of .45 revolvers, gladly taking even the old style, slow-working, single-action ones.[4]

The result of these experiences, of course, affected the American military scene and sparked the search for a larger handgun in .45 caliber (11.43mm).

While the Americans tried to pacify the Philippines, the British were experiencing their own problems with the Boers. From that war came several excellent stories about the use of handguns in combat. The British officers in South Africa carried .455 caliber Webleys with 102-millimeter barrels, along with their swords, knifes, field glasses, and whistles. Unlike the American Colt revolvers, which had been created as cavalry weapons, the Webleys were intended to be used by infantrymen at close quarters as personal defense weapons. On Saturday, 6 January 1900, the Boers attacked the British forces defending Wagon Hill at the besieged town of Ladysmith. The first firing had begun at 2:40 in the morning, and the battle lasted until midday. By 11:00, Colonel Ian Hamilton had felt confident enough to order some of his men out of the front lines to break for lunch. At about thirteen hundred, Lieutenant Digby-Jones and Major Miller-Walnut were seated beneath a canvas awning to escape the noon-

time heat when a small party of Boers led by Field Cornets DeVillers and DeJager appeared over the parapet. As the Free Staters advanced, the British broke in panic. Colonel Hamilton got the bad news that the Boers had broken through when one of his men fell dead beside him. Digby-Jones sprang to his feet, drew his Webley, and dropped DeVillers. Someone else shot DeJager. Hamilton took advantage of this turn of events to draw his own revolver and rally his men. Quick action on Digby-Jones' part had broken the Boer attack. As Greener had said, "When one needs a revolver, one wants it very badly."[5]

The British army stuck to its revolvers, and British officers were still carrying them when the First World War erupted in Europe. But not all of Great Britain's heroes favored the Webley. Captain Robert Gee won his Victoria Cross in 1917 while using a .45 caliber Model 1909 Colt New Service revolver. Twice-wounded, recipient of the Military Cross, and mentioned in dispatches, Gee was already something of a hero when he took part in the great counterattack at Cambrai on 30 November 1917. Temporary Captain of the 2d Battalion, Royal Fusiliers, Gee found himself captured by a strong enemy force that had broken through the British lines. Captain Gee, opposed to being a prisoner of war, killed one of his captors with a spiked stick and escaped. He then organized a small party from the brigade staff with whom he attacked his former captors. They were followed closely and supported by two English infantry companies. With these troops, Gee reestablished a defensive flank before turning his attention to a German machine gun unit. With a revolver in each hand and followed by only one man, Gee rushed the gun emplacement. He killed eight of the gun crew, captured the weapon, and returned to his own lines despite being wounded. He was awarded the Victoria Cross for "conspicuous bravery, initiative, and determination."[6] Captain Gee's Colt revolver is on display at the Royal Fusilier's museum at the Tower of London.

While the British were learning to utilize the handgun in the trenches of Europe, the Americans were still using their pistols as cavalry weapons. After the U.S. Army adopted the .45 caliber (11.45mm) Model 1911 Colt Browning pistol, they

FIGURE 17–1. A U.S. Army sergeant shows his .38 caliber Colt Army revolver, circa 1900. *(National Archives)*

FIGURE 17–2. British officers practicing with their handguns. The three men on the left have Webley revolvers, while the officer on the right is aiming a C96 Mauser pistol. *(National Army Museum, U.K.)*

were issued to cavalry units in the western states. The troops of the 11th Cavalry used them on 5 May 1916 at a fight at the Ojos Azules ranch near Cusihuiriachic, Mexico, in what was probably the last cavalry charge in North America. Troopers of the 11th Cavalry and their 30-odd Apache scouts arrived at the Ojos Azules ranch at dawn. A lone Villista sentry, who spotted these members of General John J. Pershing's punitive expedition, opened fire. The Apaches dismounted and began using their Model 1903 Springfield rifles. After a few minutes, it became obvious that the Americans would not be able to dislodge the Mexicans by dueling with them at 900 meters.

Lieutenant A. M. Graham, A Troop commander, ordered his men forward, down the road into the ranch. Graham gave the order to draw pistols. Each trooper pulled his Model 1911 Colt Browning .45 self-loader from its holster, pulled the slide back, and let it snap forward, thumbing up the safety. Rifles popped off to the left where the scouts were shooting at long range toward the Villistas, and Mexicans were seen running from the buildings to their horses grazing in the hills beyond the ranch. The bugler sounded the charge, and Graham spurred his horse, leading A Troop down the road. They thundered ahead at a gallop and came under heavy but inaccurate rifle fire from the ranch where some thirty or forty Villistas had determined to make a stand from the ranch building roofs. The soldiers swept through, pistoling bandits who were running through the yard, some half-dressed. Graham watched as one horseman cleared a gate connecting a barbed wire fence that ran at a sharp angle behind the buildings. He followed and made an equally spectacular leap over the gate landing almost beside the Mexican's horse. Graham got so close that he was able to shove his pistol under the fleeing man's armpit and pull the trigger. D Troop was stopped by the fence, but with wire cutters they snipped a hole wide enough to allow their horses to pass through in column. But they were stopped again 100 meters past the fence by fire coming from the Villistas, who had established a defensive line among the pines on the slope of a hill. The troopers dismounted to return the fire and were joined by their scouts. Several Mexicans were killed and others fled up the hill in fighting that lasted only twenty minutes. Machine-gun troops had also participated briefly after the battle opened, firing into the buildings at a range of 1,500 meters, but inflicting no damage. Pistols and rifles had killed forty-two Villistas in and near the ranch, and another nineteen were accounted for by A Troop, when they pursued the retreating enemy into the hills south of Ojos Azules. No Americans had been shot in the close-in combat.

The cavalry charge at Ojos Azules ranch in 1916 ended an era. Hereafter, the pistol was essentially an infantry weapon, used as a personal defense weapon, not as an offensive weapon. There were, of course, exceptions. Corporal Alvin York, for example, a 31-year-old Tennessean, captured a German machine-gun battalion, killing 20 to 25 German soldiers and taking 132 prisoners while armed with only his Springfield rifle and his Model 1911 Colt Browning pistol. On 9 October 1918, the 1st Platoon, G Company, 2d Battalion, 328th Infantry, 82d Division, was pinned down by German machine guns near the French towns of Chatel Chehery and Carnay. Corporal York led one of the squads sent to silence the gun. After a brief fire fight, York and seven privates returned with their prisoners.

> The records of the 82d Division reveal no more extraordinary act of individual gallantry and achievement than is accredited . . . to Sergeant Alvin C. (No. 1,910,426) York, Co. G, 328th Infantry. York is a farmer, 31 years old, whose home is located at Pall Mall, Tenn., in the mountainous and northeastern corner of the state.

On the 8th of October, 1918, York was a corporal in G Company, 328th Infantry. This company was the left assault company of the 2d Battalion, which jumped off from the crest of Hill 223 just north of Chatel Chehery and attacked due west, with its objective, the Decauville Railroad, two kilometers due west. The local success achieved by this battalion was, in itself, of outstanding proportions. About 300 prisoners were taken and nearly 200 dead Germans left on the ground and material captured, which included four 77's, a trench mortar battery, a complete signal outfit and 123 machine guns. The attack was driven through in spite of resistance of a very savage character and most destructive enemy machine-gun and artillery fire. The battalion suffered enfilade fire from both flanks.

The part which Corporal York individually played in this attack is difficult to estimate fully. Practically unassisted, he captured 132 Germans (three of whom were officers), took about 35 machine guns and killed no less than 25 of the enemy, later found by others on the scene of York's extraordinary exploit. York is well known is his section of Tennessee for his remarkable skill with both rifle and pistol.

Corporal York described the events of the day:

> Sergeant Harry M. Parsons was in command of a platoon of which my squad was a part. This platoon was the left support platoon of G Company, my squad forming the extreme left flank of the platoon. The valley was covered by machine-gun fire from the right . . ., from the front, and from the left front. Machine guns from the left front were causing a great deal of damage to our troops advancing across the valley. Sergeant Parsons was ordered to advance with his platoon and cover our left flank. As the fire was very hot in the valley, we decided to skirt the foot of the hill on our left and thereby gain some protection. We had advanced a little ways . . . when we were held up, by machine guns from our left front. . . . Sergeant Parsons told Sergeant Bernard Early to take two squads and put these machine guns out of business; so my squad being the left squad, was one of those chosen.
>
> We advanced in single file. The undergrowth and bushes were so thick that we could see only a few yards ahead of us, but as we advanced, they became a little thinner. In order to avoid

FIGURE 17–3. First Sergeant Chicken, who led the Apache scouts at the Ojos Azules fight, is holding his Model 1911 Colt Browning in his raised hand. His subordinate is drawing his pistol from its holster. (1916) *(National Archives)*

frontal fire from the machine guns, we turned our course slightly to the left, thereby working around on the right flank of the machine guns and somewhat to their rear, which caused us to miss these forward guns. . . . As we gained a point . . . somewhat in the rear of the machine guns, we turned sharply to the right oblique and followed a little path which took us directly in rear of the machine guns. . . .

We burst through the undergrowth and were upon the Germans before we knew it. . . . There was a little shack thrown together that seemed to be used as a sort of P.C. [Command Post] by the Germans. In front of this, in a sort of semicircular mass, sat about seventy-five Boche, and beside a chow can, which was near the P.C., sat the commanding officer. The Boche seemed to be having some kind of conference.

When we burst in on the circle, some of the Boche jumped up and threw up their hands, shouting "Kamerad." Then the others jumped up, and we began shooting. About two or three Germans were hit. None of our men fell.

Sergeant Early said, "Don't shoot any more. They are going to give up anyhow," and for a moment our fire ceased, except that one German continued to fire at me, and I shot him. In the meantime, the Boche upon the hill with the machine guns swung the left guns to the left oblique and opened fire on us. I was at this time just a few paces from the mass of Boche who were crowded around the P.C. . . . Those who did not take cover were either killed or wounded by the Boche machine-gun fire, the range being so close that the clothes were literally torn from their bodies. Sergeant Early and Corporal Cutting were wounded, and Corporal Savage was killed. . . . By this time, those of my men who were left had gotten behind trees, and

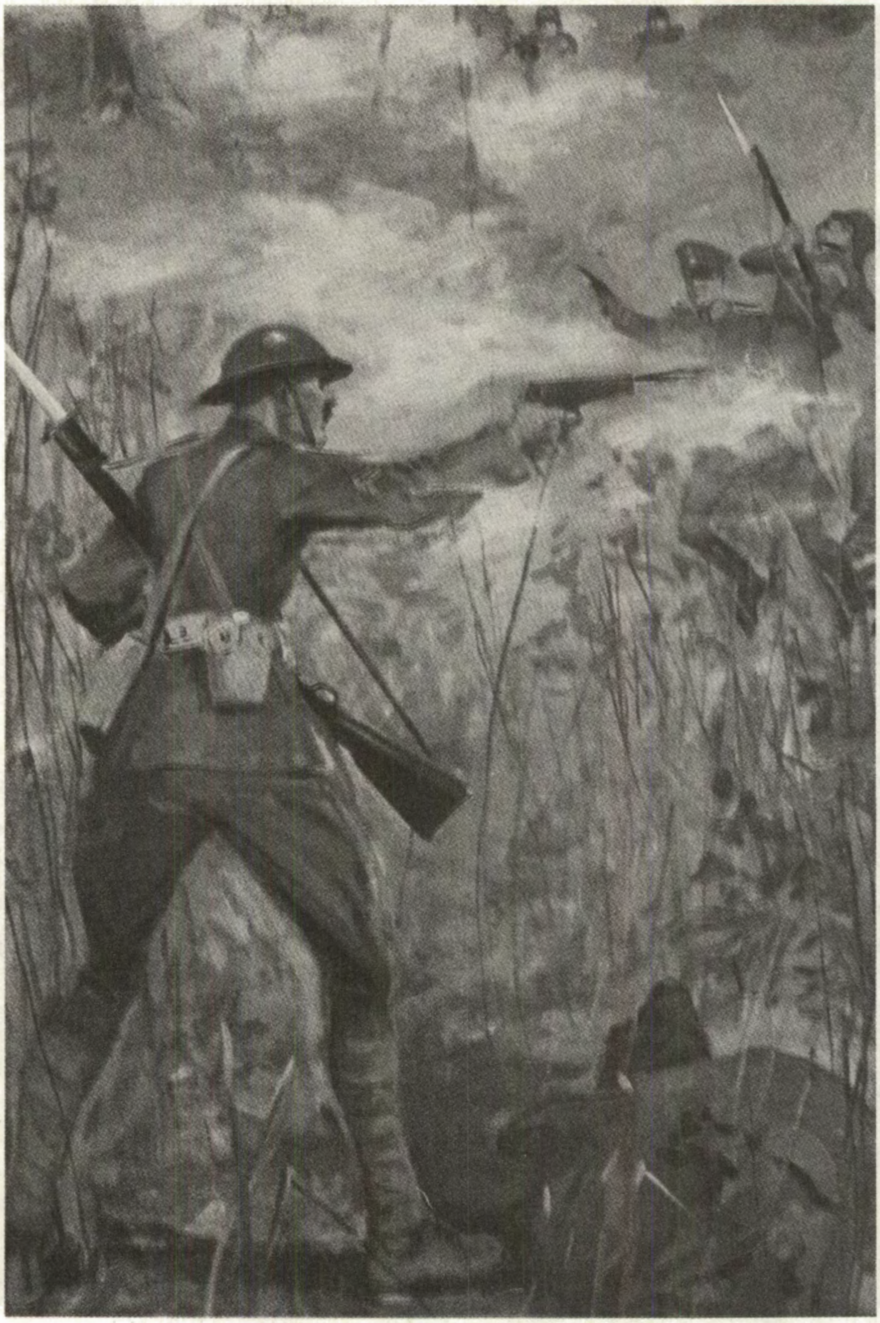


FIGURE 17–4. A post war painting of Corporal Alvin York in action against the Germans on 9 October 1918. *(Skeyhill)*

FIGURE 17–5. General John A. Lejune's Model 1911 pistol, holster, and webbed gear, which he carried in France during World War I. *(Smithsonian)*

two men sniped at the Boche. . . . But there wasn't any tree for me, so I just sat in the mud and used my rifle, shooting at the Boche machine gunners. I am a pretty good shot with the rifle, also with the pistol, having used them practically all my life, and having had a great deal of practice. I shot my rifle until I did not have any more clips convenient and then I used my pistol.

The Boche machine-gun fire was sweeping over the mass of Germans who were lying flat, and passing a few inches over my head, but I was so close to the mass of Germans who were lying down that the Boche machine gunners could not him me without hitting their own men. There were about fifty Boche with the machine guns, and they were under the command of a lieutenant. By this time, the remaining Boche guns had turned around and were firing at us, and the lieutenant with eight or ten Germans armed with rifles rushed toward us. . . .

I just let the Boche come down the hill and then poured it into them with my pistol, and I am, as I said before a pretty good shot with a pistol. I shot the lieutenant, and when he was killed, the machine-gun fire ceased. During the fight I kept hearing a pistol firing from the midst of the Boche who were lying on the ground. This was evidently the commanding officer shooting, as he was the only one in the crowd armed with a pistol, and all of his clips were empty when I examined them later. . . .

When we got the [surrendering] Boche lined up in a column of twos, I scattered my men along and at the rear of the column and told them to stay well to the rear and that I would lead the way. So I took the commanding officer and the other two officers and put one in front of me and one on each side of me, and we headed the column. I did that because I knew that if I were caught on the side of the column, the machine gunners would shoot me, but that if I kept in the column, they would have to shoot their officers before they could kill me. In this manner we advanced along a path and into the machine-gun nest. . . .

. . . One [machine gunner] aimed a rifle at me from behind a tree, and, as I pointed my pistol at him, the commanding officer said, "If you won't shoot any more, I will tell them to surrender." He did and we added to our column.[8]

For this exploit, Corporal York was awarded the Distinguished Service Cross and later the Congressional Medal of Honor.

Although there were notable exceptions as the story above illustrates, the handgun was usually considered a secondary weapon by American military men. For officers and noncommissioned officers, it would serve as a last-ditch defense weapon behind enemy lines. Several officers, however,

became famous either because of their exploits with pistols or because of the particular pistols they carried. A few vignettes help make this point.

Theodore Roosevelt is best remembered for his brief experiences with the ragtag group of volunteers he accompanied to Cuba during the Spanish-American War. Known officially as the First U.S. Volunteer Cavalry, Roosevelt's horsemen gained national fame as the Rough Riders. Their charge up San Juan Hill outside of the key port city of Santiago was particularly well publicized. Roosevelt had resigned his post as assistant secretary of the navy to organize the Rough Riders, but lacking military experience he accepted the position of second in command. He was lieutenant colonel to Colonel Leonard Wood, a young army surgeon. After an early engagement with Spanish forces, Colonel Wood was placed in command of a larger unit, and Roosevelt became the leader of the 1st Volunteers. His Rough Riders were 490 strong, plus a score of black soldiers from the 10th Cavalry. On the first of July, they were faced with the task of removing an entrenched force of Spanish regulars from the top of San Juan Hill. As they advanced, the Rough Riders found it necessary to dismount and proceed on foot. As they moved forward, men from another unit drifted into their ranks as they tried to withdraw from the fight. Roosevelt later recorded: "This I could not allow, as it was depleting my line, so I . . . drew my revolver, halted the retreating soldiers and called out to them [that] I appreciated the gallantry with which they had fought and would be sorry to hurt them, but that I should shoot the first man who, on any pretense whatever, went to the rear." The pistol Teddy Roosevelt brandished was a .38 caliber Colt Model 1889 revolver (serial number 16,334) that had been given to him after it had been recovered from the sunken battleship *Maine*. As he moved forward with his men, Colonel Roosevelt shouted encouragement while waving his hat in one hand and his Colt in the other. By the end of the day, the hills surrounding Santiago had been secured, and the surrender of the city followed shortly thereafter. This was the most important land engagement in this "splendid little war" with Spain. Roosevelt's pistol survives, and it bears two inscriptions: "From the sunken battleship Maine" one the left side of the frame, and "July 1st 1898, San Juan Hill. Carried and used by Col. Theodore Roosevelt" on the right.

Many other American officers carried handguns. Some were reasonably quiet about their experiences; others were flamboyant like Roosevelt. Major General John A. Lejune, a marine's marine, was never seen during the First World War without his Model 1911 Colt Browning pistol. His Model 1911 (serial number 217,183), holster, and webbed gear are now part of the firearms collection at the Smithsonian's National History Museum. Wherever Lejune went as he commanded the 64th Army Brigade of the 32d Division and later the 2d Division, he had carried this particular handgun.

A Model 1873 Colt Single-Action Army, caliber .45 (11.43mm) with a 121-millimeter barrel, resides in the firearms collection at the U.S. Military Academy Museum at West Point. This revolver was purchased by Jonathan M. Wainwright on 21 April 1906, the year he graduated from the Academy. It carried him through the Moro insurrection of 1907 and 1908, the Mexican punitive expedition of 1916, and numerous World War I battles (Toule, Pont-à-Mousson, Saint-Mihiel, and the Meuse-Argonne), and into the early days of the American involvement in the Second World War. He was armed with his Single-Action Army until his American and Filipino troops on Corregidor were forced to surrender to the Japanese in the face of overwhelming odds on 6 May 1942. In the confusion of the surrender, however, Wainwright was able to wrap his revolver in an oily cloth and hide it in a hollowed-out tree. It rusted badly during the three years it lay there, but it survived the war as did its owner. The general and his Colt were reunited in 1947, two years after the liberation of the Philippines.

When it came to gun-collecting generals, George S. Patton, Jr., surpassed all his colleagues. Born and reared on his family's ranch near Pasadena, California, Patton came from a long line of military men. After a year at the Virginia Military Institute, Patton spent an undistinguished five years at West Point. Not much of a classroom student, Patton excelled at shooting and horsemanship, and as a second lieutenant in the cavalry was assigned to Fort Bliss, Texas, in 1916. He took it upon himself to hone the sear of his army-issue Model 1911 pistol to give it a light trigger, but he did too good a job. One day when he stamped his foot, the pistol went off and a bullet creased his right thigh. Thereafter, he preferred revolvers to automatics, and he always kept a fired cartridge in one chamber, with the cylinder turned so that the empty case was under the hammer, just to make sure that there would be no more accidental discharges.

During his years in Texas, Patton acquired an engraved, ivory-handled, .45 caliber (11.43mm) Model 1873 Colt Single-Action Army revolver (serial number 332,088) for about $50 from the Shelton Payne Arms Company. Figure 17–6 shows Patton in Sicily in August 1943 with this particular handgun. The revolver is now on display at the West Point Museum, along with the Smith & Wesson Model 27 .357 Magnum revolver (serial number 47,022) he acquired in 1935.

In March 1916 after Pancho Villa's forces raided Columbus, New Mexico, Patton accompanied Pershing on his punitive expedition into Mexico. He was assigned to a motorized unit that conducted patrols in the Chihuahua region. During one of these patrols, Patton and his men, using the mobility provided by their Dodge automobiles, surprised one of Villa's "Colonels," Julio Cardenas. Cardenas and two of his compatriots saw the patrol coming, mounted their horses, and tried to escape, but they could not get past the Americans because their cars approached from three different directions, while the fourth way was blocked by a couple of American soldiers. In the gun battle that followed, Patton shot the horse from under one of the Mexicans and then killed the rider as he drew his revolver and started firing. Patton also wounded Cardenas, but this Villista continued to trade bullets with the patrol until one of the scouts killed him. The third bandit was killed by a heavy fusillade. In camp that night, Patton carved two notches on his Colt. Evidently, he credited himself with killing Cardenas' two men but felt that the wounded colonel might have escaped if the scout had not delivered the final shot.

During the First World War, Patton helped pioneer the use of tanks in France. On his first tour on the Western front, Patton carried an ivory-handled Colt Browning Model 1911 pistol. The detachment he was leading in the Argonne woods on 16 September 1918 was stopped by withering machinegune fire. To complicate matters several of his tanks became

FIGURE 17–6. Lieutenant General George S. Patton, Jr., talking to his troops in Sicily, August 1943. Note his Single-Action Army, the German Mauser 98, and the German Leica camera. *(U.S. Army)*

stuck in the mud. The infantrymen accompanying them refused to stand up under fire and dig the vehicles out, so to encourage them Patton mounted the parapet of a trench and strode up and down, issuing orders as bullets whistled past him. If these actions were not enough, Patton asked for volunteers and charged off in the direction of the German machine guns. Four of his five men were killed, and Patton took a bullet in the thigh and was unable to continue. Corporal Joseph T. Angelo, meanwhile, had spotted the hidden machine guns and clambered onto a tank that had begun moving again. He signaled directions to its driver and wiped out the gunners. Angelo and Patton earned the Distinguished Service Cross because of their bravery, but Patton was too badly wounded to do any more fighting for a time.

During the inter-war years, Patton added to his collection of handguns. He owned a .22 long rifle (5.6mm) Colt Woodsman target pistol, a .38 caliber (9mm) Colt Detective Special, a .380 (9mm Browning) Colt Browning pocket pistol, a .32 (7.65mm Browning) Colt Browning pocket pistol, a Smith & Wesson Model 27 .357 Magnum (9mm) revolver, and a .380 Remington Model 51 self-loader. The Remington (serial number PA-15,470) had wooden grips with ivory stars. On D-Day of the Second World War, Patton landed at Normandy carrying his .45 Colt Single-Action and his Smith & Wesson .357 Magnum. These handguns were given to the West Point Museum following Patton's death in a traffic accident near Mannheim, Germany, on 9 December 1945.[9]

For all the heroic stories associated with the use of military handguns, literally thousands were carried and never used. This chapter closes with a series of photographs that illustrate handgun usage from 1914 to 1945.

FIGURE 17–7. Lieutenant General George S. Patton, Jr., Commanding Officer, Third Army, shakes hands with Lieutenant General Alexander M. Patch, Commanding General, Seventh Army, in Saarsburg, France, 4 December 1944. Note General Patton's Colt .38 caliber Detective Special revolver. *(U.S. Army)*

NOTES

1. W. W. Greener, *Sharpshooting for War and Defence* (London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1914), p. 128.

2. John E. Parsons, *The Peacemaker and Its Rivals; An Account of the Single-Action Colt* (New York: William Morrow & Co., 1953), p. 82.

3. Donald Smythe, *Guerrilla Warrior: The Early Life of John J. Pershing* (New York: Charles Scribner's Sons, 1973), p. 161.

4. Parsons, pp. 82–83.

5. Thomas Pankenham, *The Boer War* (New York: Random House, 1979), p. 286.

6. Sir O'Moore Creagh and E. M. Humphris [sic], *The V.C. and D.S.O.: A Complete Record of All Those Officers, Non-Commissioned Officers and Men of His Majesty's Naval, Military and Air Forces Who Have Been Awarded These Decorations from the Time of Their Institution, with Descriptions of the Deeds and Services Which Won the Distinctions and with Many Biographical and Other Details* (London: The Standard Art Book Co. Ltd., 1931), p. 267.

7. Herbert Molloy Mason, Jr., *The Great Pursuit* (New York: Random House, 1970), pp. 166–68.

8. Thomas John Skeyhill, *Sergeant York, Last of the Long Hunters* (Philadelphia et al: John C. Winston Co., 1930), pp. 208–15.

9. The Roosevelt, Lejune, Wainwright, and Patton stories are based on Robert Elam, *Fired in Anger; The Personal Handguns of American Heroes and Villains* (New York: Doubleday, 1968), pp. 438–43, 447–69.

FIGURE 17–8. At a divisional review near Zellhausen, Germany, General Patton awards battle streamers to the 86th Cavalry Reconnaissance Squadron of the 6th Armored Division on 8 August 1945. Note that Patton is carrying a .32 caliber (7.65mm) Colt Pocket Automatic Pistol with four stars on the grip. *(U.S. Army)*

WORLD WAR I

FIGURE 17–9. Four young Austrian soldiers, ca. 1917–1918, carrying C96 broomhandle self-loaders. ***(photographer unknown)***

EUROPEAN THEATER, WORLD WAR II

FIGURE 17–10. Karakhan Sardarov, commander of the Soviet Union's Voroshilov riders, teaches his wife, Gulmama, to shoot the 1895 Nagant revolver in September 1938. *(Underhill)*

FIGURE 17–11. A scene from the Russo-Finnish Winter War. Colonel Pajari, with glasses, observes the Russian withdrawal after border negotiations at Tolvajarvi on 19 March 1940. Pajari is armed with a Lahti L-35 pistol; the other officers are carrying m/23 Parabellums. *(Finnish Defense Forces)*

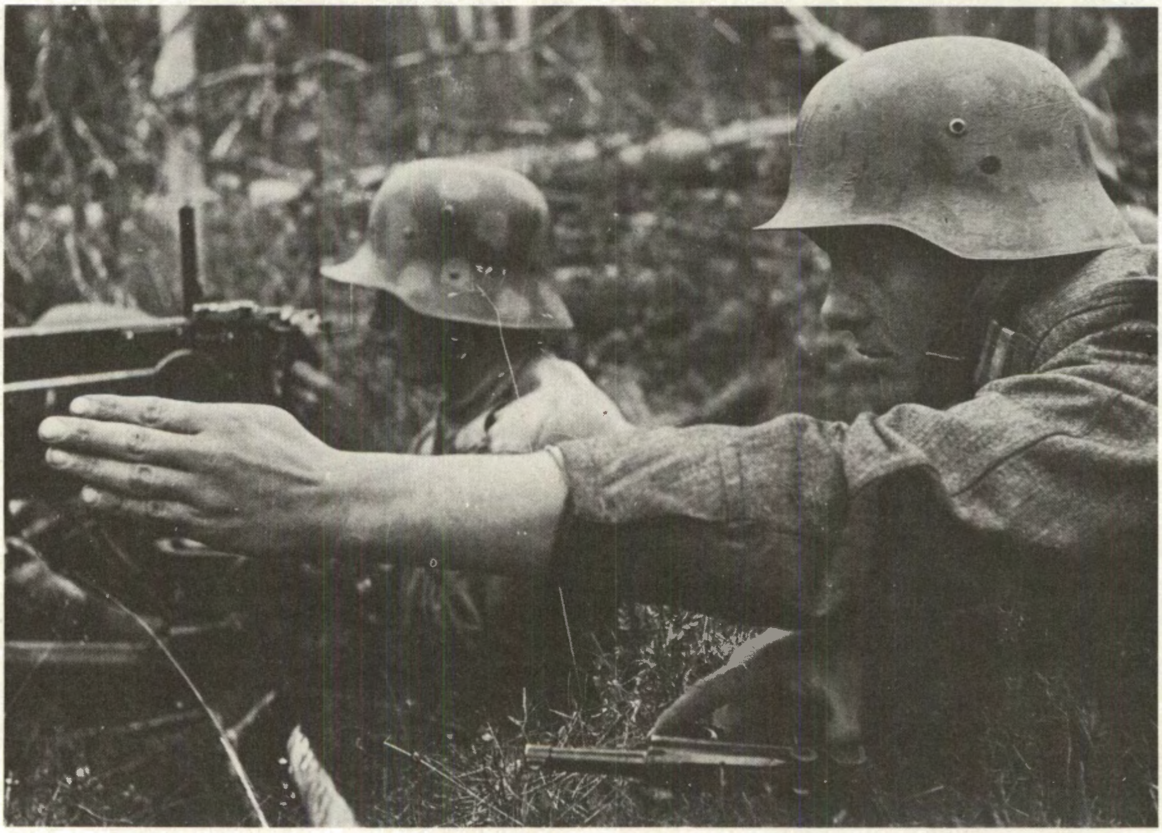


FIGURE 17–12. A Finnish machine-gun section in East Karelia during World War II. Note that the section leader is carrying a m/23 Parabellum. *(Finnish Defense Forces)*

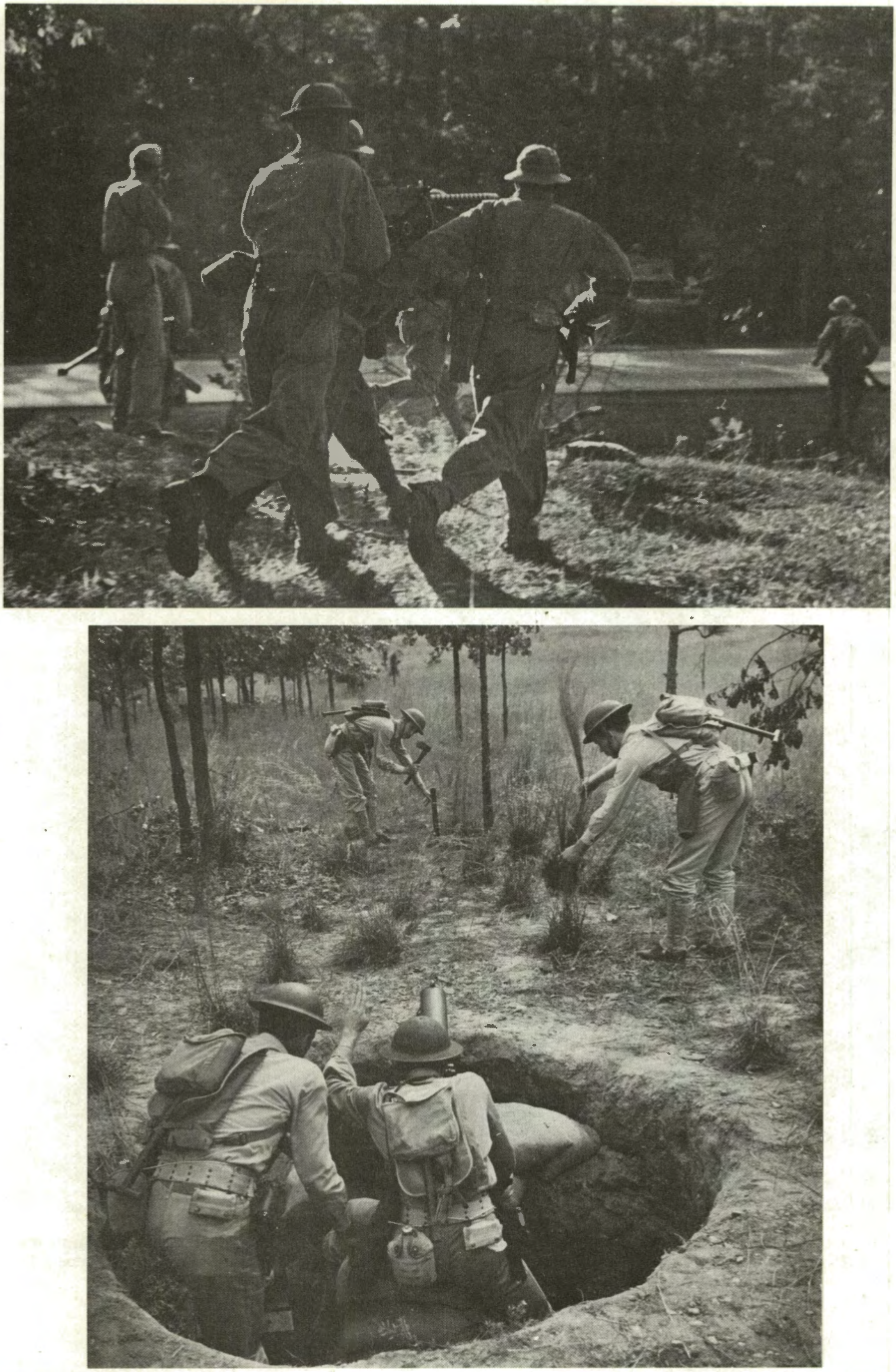


FIGURE 17–13. Prewar maneuvers in the United States, ca. 1941. Note that the soldiers in the upper photo are carrying .45 caliber (11.43mm) M1917 revolvers, while those in the lower photo are equipped with Model 1911 Colt Browning pistols. ***(Underhill)***

FIGURE 17–14. A group of armorers from the 8th Ordnance Company clean and repair handguns during First Army maneuvers in the Carolinas on 25 October 1941. *From left to right*, Private Warren Travis; Staff Sergeant M. M. Dendy; and Privates Shirley Young; Edward Stokas; Joseph Venns; and Hank Sommers. *(U.S. Army)*

FIGURE 17–15. Lieutenant Ivan Nikitovich Sereda, a Kuban Cossack who defected to the Nazi cause during World War II. Note that he is carrying a 7.62mm Tokarev pistol. *(U.S. Army)*

FIGURE 17–16. These German soldiers, somewhere in France, pose in front of an American armored car. They are smoking American cigarettes, and the man on the left is holding a Browning Modèle 1935 GP pistol. ***(U.S. Army)***

FIGURE 17–17. Two German soldiers in winter camouflage shooting their P 08 pistols. ***(photographer unknown)***

WAR SOUVENIRS, EUROPEAN THEATER, WORLD WAR II

FIGURE 17–18. Two soldiers involved in the D-Day invasion are shown with captured weapons on 11 June 1944. The man on the left holds a Walther P38, while his friend has a MP40 submachine gun. ***(U.S. Army)***

FIGURE 17–19. Staff Sergeant James Nolan, 134th Infantry Regiment, 35th Division, checks his P38 before going on leave in Nancy, France, on 6 December 1944. *(U.S. Army)*

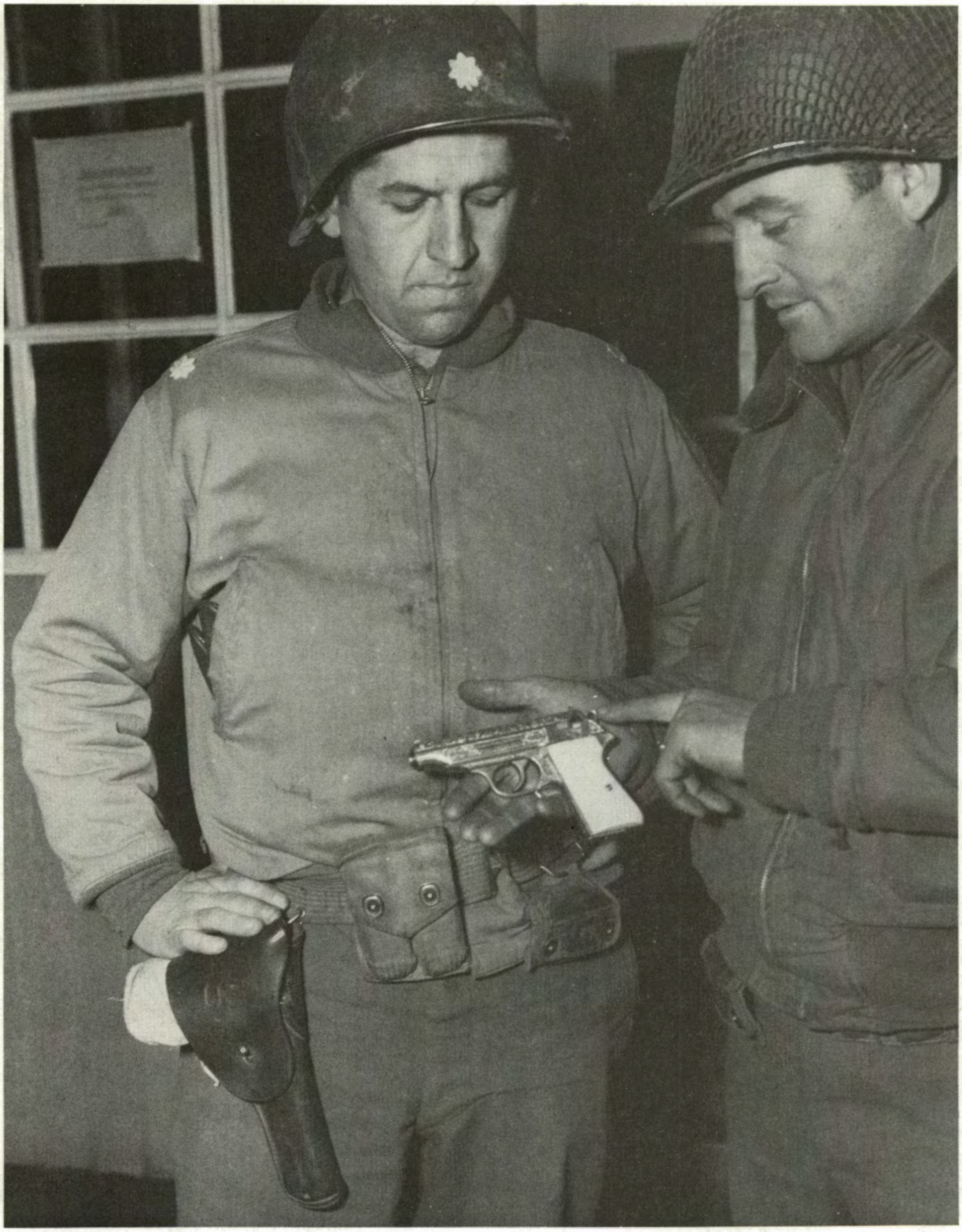


FIGURE 17–20. At the Walther Arms Factory, Lieutenant Colonel A. I. Schepps and Lieutenant Daniel H. Howell examine a gold-plated 7.65mm Walther PP. The factory was captured by the 11th Armored Division of the Third Army on 9 April 1945. *(U.S. Army)*

FIGURE 17–21. Private First Class Floyd K. Lindstran, Service Company, 7th Infantry, 3d Division, was credited with killing two German machine gunners, capturing their weapon, and then killing six other enemy soldiers. He was armed with only his Model 1911 Colt Browning Pistol. This photo was taken in the Pozzuli area, Italy, on 10 January 1944. *(U.S. Army)*

ASIAN THEATER, WORLD WAR II.

FIGURE 17–22. Sergeant Barlow J. Former and Sergeant Norman Green examine two 8mm Type 14 Japanese pistols. Both men were assigned to the 724th Ordnance Company, 24th Infantry Division. They were photographed at Rockhampton, Queensland, Australia, on 18 December 1943. *(U.S. Army)*

FIGURE 17–23. Corporal Ralph Cook, Troop A, 112th Cavalry, attempts to convince a Japanese soldier to surrender on Aitape, New Guinea, on 8 August 1944. After a short discussion, Cook shot and killed the enemy with his Model 1911 pistol. *(U.S. Army)*

FIGURE 17–24. Master Sergeant Ellick Hoffman examines a C96 Mauser pistol belonging to a Chinese Nationalist soldier on 23 January 1945. ***(U.S. Army)***

18 HANDGUN MANUFACTURE 1890 to 1945

Samuel Colt started something when he began the large scale manufacture of handguns in the 1840s. He helped to promote the concept of mass production and the utilization of interchangeable parts. Colt was a pioneer in production processes that substituted machine tools for hand tools. Colt used (and as a consequence encouraged the development of) equipment such as drop forges, milling machines, turret lathes, drilling machines and grinding machines in his famous Armory on Huyshope Avenue in Hartford, Connecticut. When the nations of Europe went to war in August 1914, Colt's factory was still the largest handgun manufacturing facility in existence.

But by that time, the Colt Armory had been joined by a number of other important handgun fabricating organizations. In England Webley & Scott had an impressive establishment in Birmingham devoted primarily to the manufacture of revolvers. The Deutsche Waffen- und Munitionsfabriken of Berlin had an industrial capacity for manufacturing large quantities of handguns in addition to the production of military rifles by the tens of thousands. In Steyr, the Österreichische Waffenfabrik Gesellschaft also had a major industrial capacity for the manufacture of military rifles and handguns. At the beginning of the war, the Fabrique Nationale d'Armes de Guerre in Liège had the capacity for the mass production of small caliber rifles and handguns, but this capacity was not utilized after the fall of Belgium. FN's employees sat out the war rather than lend aid and comfort to the dreaded Boche.

In addition to these major firms there were a number of other manufacturing organizations involved in the production of handguns; for example, the score of small workshops in the Eibar region of Spain that fabricated self-loading pistols for the French military. Even a causual examination indicated that not all of these handgun manufacturers were technologically equal. Some were involved in the mechanized mass production of handguns based upon the interchangeable parts system. Some were involved in large-scale production without the benefit of interchangeability. This second group used some machines to save labor, but they relied heavily upon hand finishing and fitting of components. Still other firms built handguns on a cottage industry basis involving the limited use of machine tools.

The level of mechanization appears to have been dependent upon two factors. The scale of production was a key element. Greenwood & Batley, Limited of Leeds, England, a leading supplier of machine tools to the firearms manufacturing industry, noted in a late nineteenth century catalog that:

> It would hardly pay to establish a Small Arms Factory on the interchangeable system, on a much smaller scale than, say for the production of 1,000 Rifles and Bayonets per week, and the complete outfit of such a Factory, with machinery, tools, fixture, and gauges, including engines, boilers, shafting &C., and also the services of a staff of men to superintend the erection and satisfactory starting of the Factory, could be supplied free on board port in England for approximately £135,000 [about $657,000].
>
> No doubt a smaller plant could be arranged, say for the production of 500 Rifles and Bayonets per week, or even less, and for a real *bona fide* enquiry MESSRS. GREENWOOD & BATLEY, LIMITED, would be glad to make out and submit a detailed estimate of the cost, on receipt of a pattern rifle.[1]

Greenwood & Batley, of course, was considering the production of weapons from scratch and the production of a single model on the production line. Still 500 guns—rifles or pistols—was the bottom limit for the economic production of weapons with the interchangeable parts. But, there was a second and sometimes more important consideration. Many times a government organization would seek to have interchangeable parts, even if it was not economical, so they could have the benefits that accrued from such production, like ease of repair in the field. Equally important was the ability to expand production. Interchangeable manufacture during peacetime was a solid foundation for large-scale production during a war.

Robert A. Howard, in his study of the degree of utilization of interchangeable parts in the manufacture of handguns before the American Civil War, discovered that interchangeability was often bypassed because of the expense associated with it.[2] Rather than demanding full interchangeability, most private arms manufacturers practiced a production system that yielded parts that were relatively close to one another. Such components could then be assembled with a varying degree of hand fitting. As Howard discovered from examining both surviving records and surviving handguns, there were two systems of manufacture; one based upon the interchangeability of parts and one based on the basic uniformity of parts. Private arms makers seem to have found the "uniformity system" more economical for their smaller scale commercial production, than they would have found complete interchangeability. With the uniformity system they could produce parts by machine processes, without the careful attention to cutter settings and without the expense of large quantities of inspection gauges. These manufacturers got close to interchangeability, but obtained the final fitting

through hand finishing. For the quantities they made it was still economical in terms of time and money to use men to do the work that could also be done by machines.

As Howard pointed out in his study, machine processes theoretically produce parts exactly alike. In practice the cutters, drill bits, and grinding surfaces wear during the production process, making each successive component is ever so slightly larger than the preceding one. Prior to the time when machines had feedback systems—an automatic system of gauging—the machine operator would have to stop his machine and gauge his product. As the tolerances began to exceed those acceptable for interchangeable assemblies, the machine-tender would have to adjust his cutters to compensate for the wear. Many gun makers let the tolerances grow beyond the point where the components would freely interchange in an effort to maximize the number of parts produced by a given machine operator. Individuals trained as hand fitters could compensate for these tolerance slippages when it came time to assemble parts to the finished firearm. Obviously, hand labor was cheaper than the combination of the labor of the machine-tender and the gauges required to assure interchangeability.

Prior to receiving their first contracts from the British government, the Webley family produced handguns using the uniformity system. As noted in chapter 2, Henry and Thomas William Webley believed that any successful service revolver had to be manufactured with completely interchangeable parts. The Webleys also realized that long-term government contracts were required to make it economically feasible for them to undertake true interchangeable manufacture. It made little difference to them if the government contracts guaranteed them large-scale quantities over the years or prices for smaller numbers of handguns that would compensate them for their production of interchangeable components. Interchangeability had to be subsidized one way or another; large-scale production or high unit prices.

The economics of interchangeable manufacture led many companies to seek government contracts. Companies such as Colt in the United States and the Deutsche Waffen- und Munitionsfabriken of Germany gambled with the initiation of production of a handgun on the interchangeability principle, because they thought they had a good chance of selling their handgun to the military. Once they obtained military contracts these same firms continued to seek commercial sales and export sales to insure the long-term economic operation of their production line. Prior to 1906, DWM manufactured an average of 100 Luger Parabellum pistols per week. This questionably economical production paid off when the German military began to purchase the Parabellum. Between 1907 and 1914 the production of these pistols at DWM averaged about 1,500 per week. During the war years, DWM built between 5,000 and 6,500 Parabellums per week. In the United States, during the first year of the manufacture of the Model 1911 Colt-Browning self-loading pistol, Colt only produced about 375 Model 1911s per week for the U.S. Army. By the time the United States entered the war this figure had risen to over 750 per week. But the proof of the interchangeable production system was the fact that Colt could increase its production level to 2,290 pistols a day in 1918; that is a weekly average of 11,450. During the Second World War, Remington Rand equaled that rate by producing a weekly average of more than 10,000 Model 1911 pistols each week during 1944. And as noted in chapter 6, the United States Army Ordnance Department was able to obtain interchangeability between the components made at Colt, Remington Rand, and the Ithaca Gun Company.

Going back to the British Webley revolvers, parts interchangeability was a necessity when a nation had troops scattered around the world. British army armorers had to be able to repair a number of different pieces of equipment, and interchangeable repair parts made this possible. Logistical considerations demanded that during the service life of a given weapon that changes to the basic pattern should be minimized, and that no changes should be introduced that would destroy interchangeability. Through the six basic versions of the Webley revolvers—Marks I through VI—the British were

FIGURE 18–1. The Colt Model 1894 New Army revolver. Essentially the same as the Navy model, this handgun was made from raw steel by a series of intricate machining processes. *(Smithsonian)*

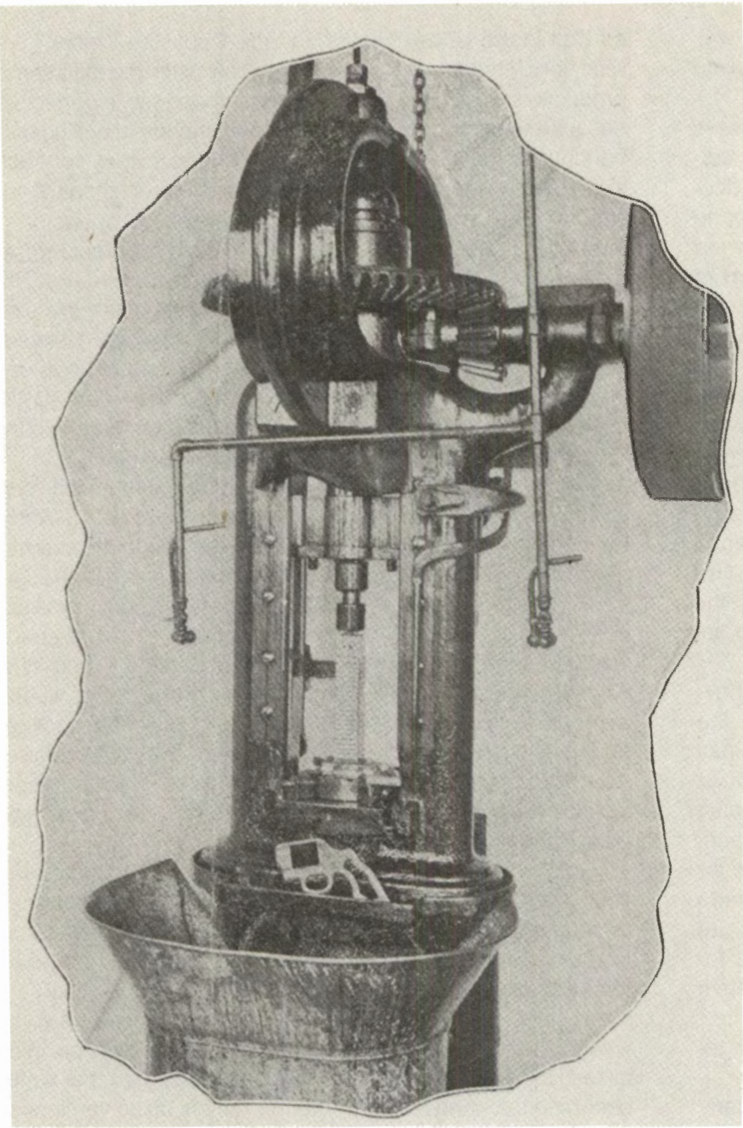


FIGURE 18–2. This broaching machine was used to cut the mortise for the cylinder in the revolver frame. *(Iron Age).*

able to maintain this standard.

By World War II, the value of interchangeability of parts was even more important. American soldiers carried the Model 1911 pistol in Europe, Africa, Asia, and the South Pacific. All that was required to repair such a pistol was the substitution of parts. By the 1940s interchangeability was taken for granted, but it was an important element in the American war effort. Mass production of military equipment with interchangeable components permitted the United States to be the Arsenal of Democracy. During 1944, Remington Rand's weekly production of Model 1911A1 pistols was roughly equivalent to the combined P 38 production at Walther, Mauser and the Spreewerke. In the end it was the American's ability to out produce the Axis powers that led to their defeat. From a low level of manufacture, the United States was able to expand its production of military materiel because it had mastered the techniques of the American system of interchangeable parts and applied it to mass production of such equipment.

HANDGUN MANUFACTURE BEFORE WORLD WAR II

In the decades preceding the Second World War, the machine tools used in the manufacture of handguns were significantly improved. Still, the basic techniques employed from the 1860s to the 1940s remained essentially the same. An 1897 article in *Iron Age,* a trade publication, described some of the processes used to manufacture the 1895 Navy version of the Colt Model 1894 New Army Revolver.

The frame of the Colt service revolver began as a red-hot lump of special open-hearth furnace steel that was inserted into the die surface of a drop forge. After the hammer fell, a workman removed a forging that had the rough outline of the frame. Placed on the bed of a milling machine, "the right hand face is milled, and this becomes for the next few steps the working surface." The cylinder mortise, the hole into which the cylinder would fit, was then broached at right angles to

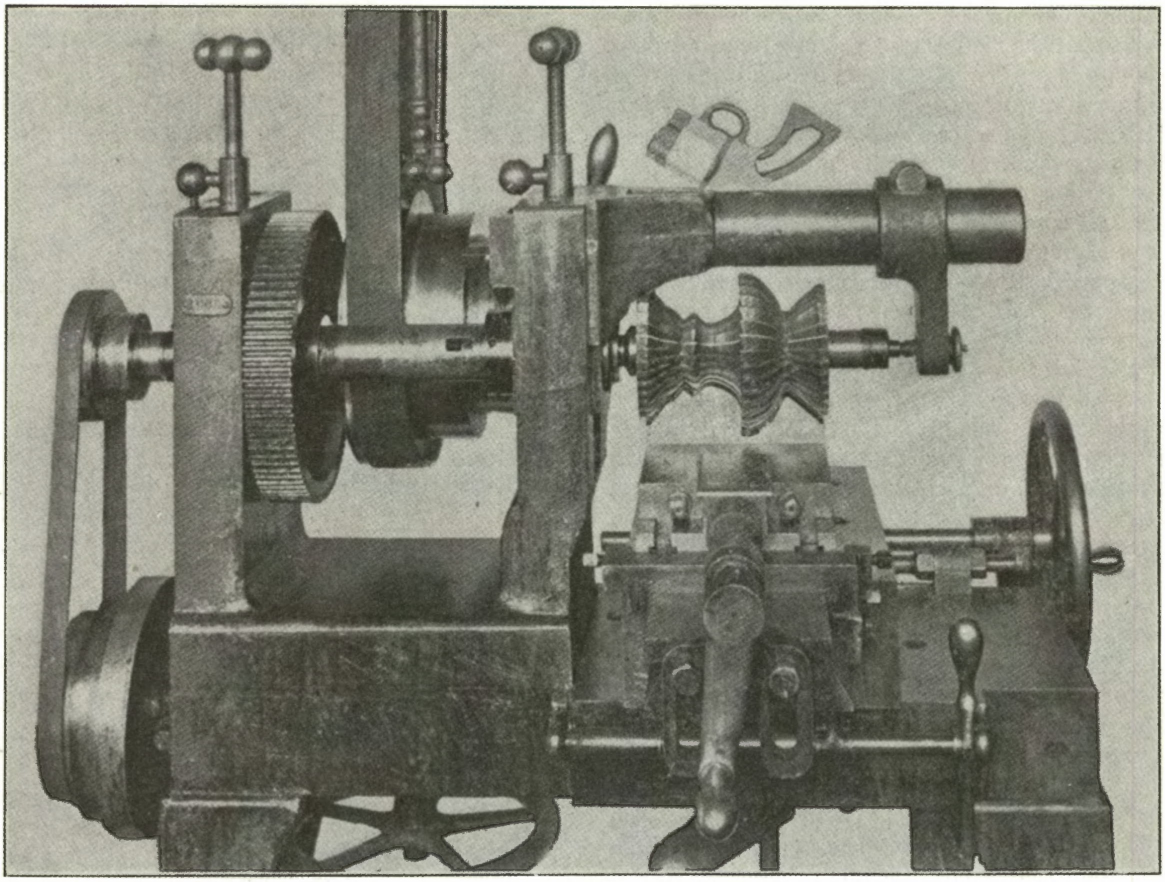


FIGURE 18–3. This milling machine was used to cut the contour of the underside of the revolver's frame. *(Iron Age)*

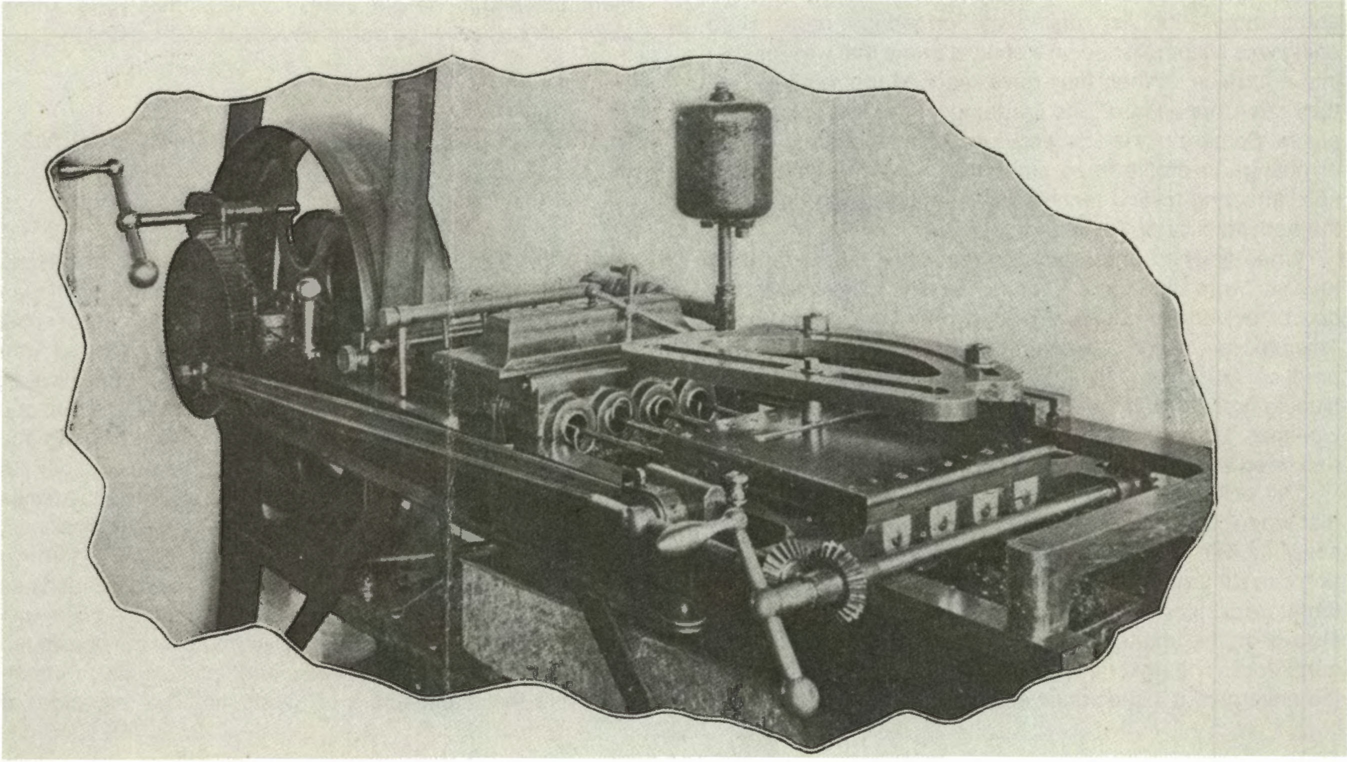


FIGURE 18–4. This rifling machine used at Colt rifled four barrels for the Model 1894 revolver at the same time. *(Iron Age)*

that first surface. "After which the opposite side [left] is milled accurately parallel with the first milled surface, and from here on the left side of the frame becomes the working surface and from it as a foundation all the gauging is done. When the number of separate and distinct operations on the frame is considered, the essential importance of having a true starting point will be appreciated." A shaving machine was used to do part of the work on the cylinder mortise, and the finishing touches were carried out with a broaching machine. A 6-inch (152mm) spindle drill was employed for drilling the various holes in the frame. Milling machines, with special contoured cutters, were employed to finish the exterior configuration of the upper and lower surfaces of the frame (see fig. 18–3).

Obviously the frame of the revolver was the most difficult part of the handgun to manufacture. "The operations on the other parts of the revolver are of a character not to require such a diversified line of machinery. All the circular parts of the cylinder are done on a lathe, the holes being drilled and the side grooves being milled. All circular work on the ejector is done on a turret head machine, and the piece is then finished on a milling machine provided with special fixtures." The barrel, also made from open-hearth steel,* was first turned on a Colt taper lathe to give it its external shape. Then the barrel stock was drilled, given a first reaming (proof reaming) and then given a second or finishing reaming. "After this it passes to the rifling machine . . ., which rifled four barrels at the same time. The twist or pitch of the rifling is governed by the position of the straight slot in the guide plate, which can be adjusted so as to produce any turn desired." With each stroke the depth of the cutter was increased, so that the steel removed with each stroke was "really an impalpable powder." In this manner high quality rifling was produced and the life expectancy of the cutters was lengthened.

Springs for the Colt New Army revolver were first forged and then milled to size, drilled and formed in a press. Hardening was accomplished on a special frame that was inserted into a furnace. "When they have reached the required heat they are dropped in oil and the temper is drawn on hot steel plates. So carefully is this work performed that the distortion or change in profile is so small that it can be ignored." A special spring-testing machine was employed to determine the acceptability of the springs.

When finished and ready for assembly, the parts of the revolver were blued in a furnace, "in which there is a large bed of pulverized charcoal placed on a heavy iron plate." This process, called charcoal bluing, had been developed to produce an uniform blue surface finish for the parts. The blueing process depended upon the "experienced eye of the workman" who removed the parts when the desired color had been attained.

The editors of *Iron Age* noted that it was "very evident that work of this character" could "only be performed successfully with the aid of a most careful system of gauging and with a thorough inspection at each step. It is not surprising therefore to learn that the number of gauges actually employed in the manufacture of the revolver runs into the hundreds." The rigid nature of the inspections conducted by the government inspectors was summarized as follows:

Barrel.—In machined state, viewed for workmanship, material and gauged; in polished state, viewed for workmanship and material; in finished revolver, viewed for workmanship and material.

Crane.—In machined state, viewed for workmanship, material and gauged; also inspected in connection with the frame; in polished state, viewed for workmanship and material; in blued state, viewed for workmanship and material.

Cylinder.—In machined state, viewed for workmanship, material and gauged; in polished state, viewed for workmanship and material; in blued state, viewed for workmanship, and material; in finished revolver, viewed for workmanship and material; also its place in the frame.

Frame.—In machined state, viewed for workmanship, material and gauged; in polished state, viewed for material and workmanship; in blued state, viewed for workmanship and material; in first assembling, viewed for workmanship, and in second assembling or finished state, viewed for workmanship and material.

Side Plate.—In machined state, viewed for workmanship, material and gauged; in polished state, viewed for workmanship and material; in blued state, viewed for workmanship and material; in finished revolver, viewed for workmanship and material, and its connection with the frame.

All of the other parts were subject to equally rigorous gaugings and examinations. The result was a quality revolver assembled from interchangeable parts.[3]

In the 1890s Colt built most of their own machines and gauges, other manufacturers did likewise. For example, DWM used their own machine tools or those manufactured earlier by Ludwig Loewe & Cie. Fabrique National of Liege made their own cutters and gauges, but purchased many of their machines from Ludwig Loewe and Pratt and Whitney of Hartford. Figures 18–5 to 18–10 illustrate some of the manufacturing processes at FN for the Modele 1900. These steps are basically the same as those used by Colt.

MANUFACTURING DEVELOPMENTS DURING WORLD WAR II

During the Second World War, the ordnance organizations of several nations experimented with production techniques to speed the rate of manufacture and reduce the cost of small arms. Simple expedients such as the use of pins rolled from sheet metal—roll pins—could be substituted for pins or screws that previously had been machined. Unessential polishing was eliminated to speed the completion of parts and finished handguns and rifles. But the single most important innovation was the use of components and other assemblies that had been stamped out of sheet metal. Metal pressings, stampings, or blankings—all refer to the process of forming parts in a press—were used in such well known weapons as the British Sten gun, the American M3 submachine gun ("Grease Gun"), and the German Sturmgewehr. It should not be surprising that there were also attempts to apply this technology to the manufacture of handguns. The remainder of

*With the introduction of smokeless powder, barrels of Nitro-steel were used.

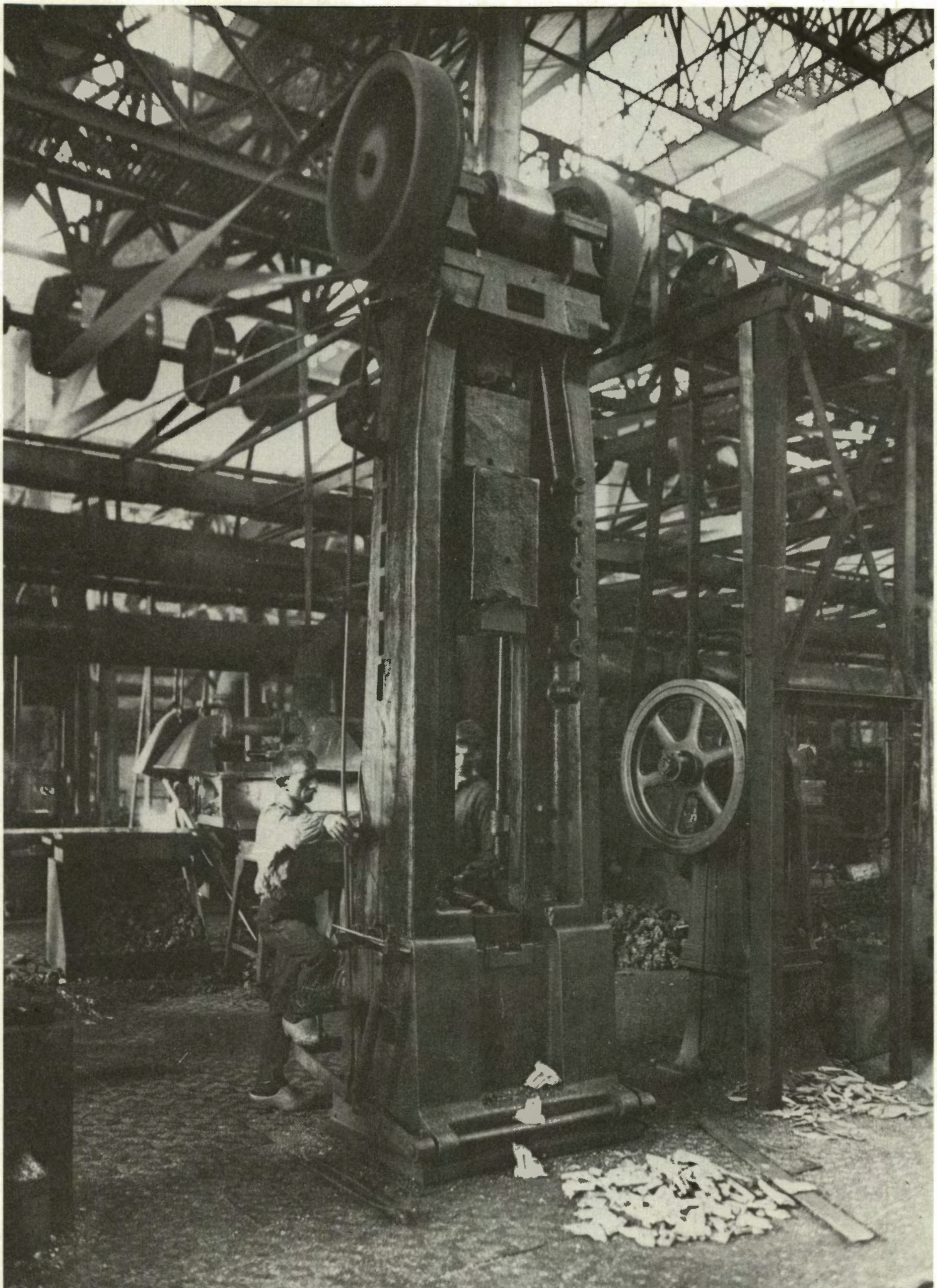


FIGURE 18–5. At Fabrique Nationale two workmen forge frames for the Modèle 1900 FN-Browning pistol. Note the pile of forgings on the factory floor. *(Fabrique Nationale)*

FIGURE 18–6. A factory worker at Fabrique Nationale turns the outside profile of the barrel of the Modèle 1900 FN-Browning pistol. ***(Fabrique Nationale)***

FIGURE 18–7. A FN worker placing Modèle 1900 pistol barrels in a vertical rifling machine. ***(Fabrique Nationale)***

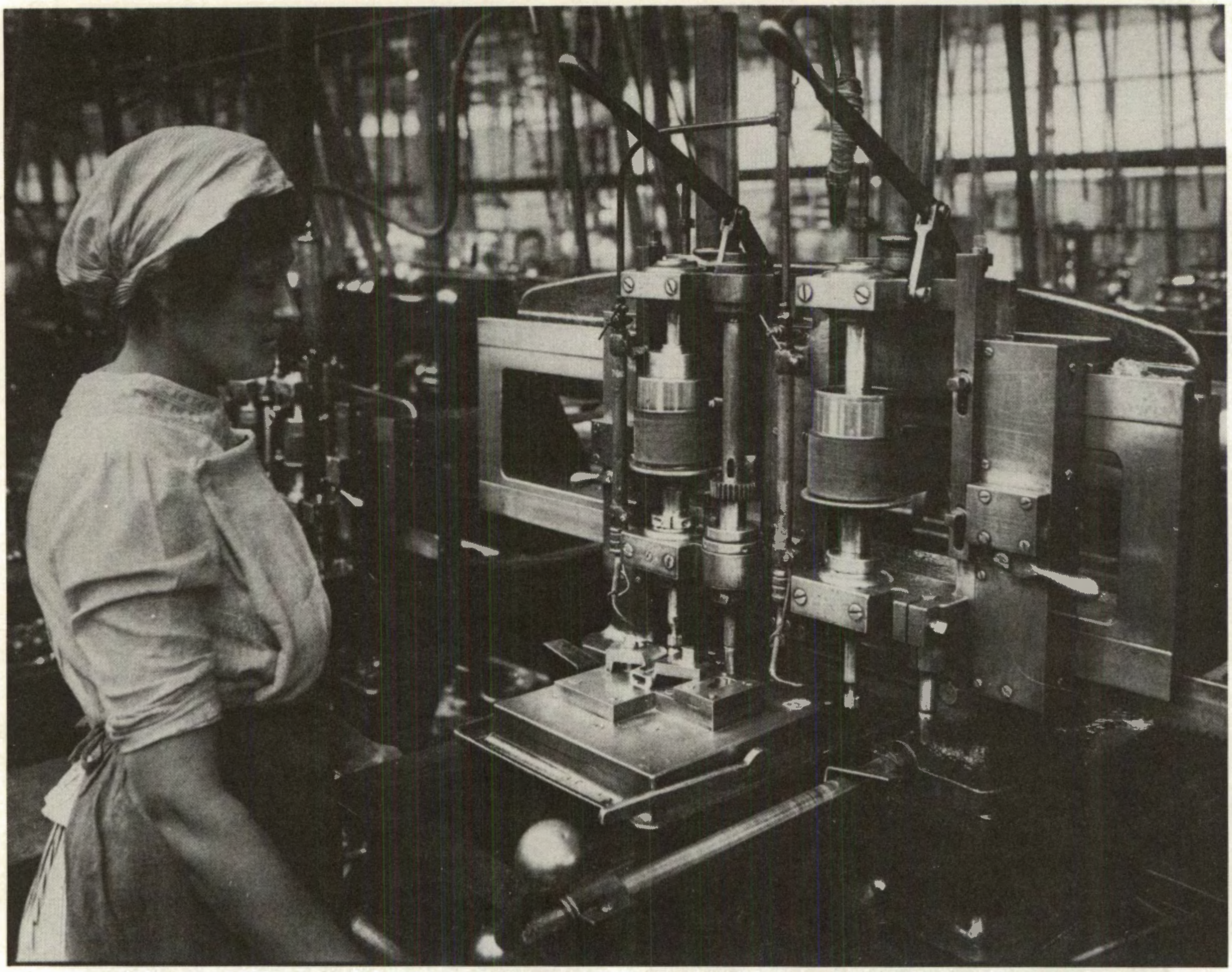


FIGURE 18–8. A two-spindle Pratt & Whitney Co. profiling machine being used to mill the exterior surface of the Modèle 1900 frame. This machine was developed for finishing gun parts. A turn-of-the-century Pratt & Whitney catalog stated: "With the two-spindle machine a roughing and a finishing milling cut may be taken at one setting of the piece, finishing it accurately to the desired dimensions and doing away with hand fitting." *(Fabrique Nationale)*

this chapter is devoted to a description of some of these sheet-metal pistols.

The Liberator

The United States Joint Psychological Warfare Committee sponsored the development and production of the .45 caliber (11.43mm) single-shot Liberator pistol as a inexpensive weapon to be dropped behind the lines in German occupied territories. Preliminary discussions relating to the development of this handgun were held between the end of March and the middle of April, 1942. The Inland Division of the General Motors Corporation was selected to design and develop this disposable weapon. To disguise its true identity and purpose the pistol project was called a *Flare Projector,* and was classified "secret." George Hyde, a gun designer of some note, led the small team that created the Liberator.

On 15 May 1942, General Motors and the United States government signed a contract for the manufacture of one million of these clandestine weapons. Production was assigned to the Guide Lamp Division's factory in Anderson, Indiana. In approximately four weeks, that factory was able to fabricate the one million pistols. Production was completed on 17 June 1942. The total cost of the Liberator contract was $1,712,767.30 or a unit cost of less than $1.72. This undertaking clearly demonstrated the production potential of mass production techniques when applied to an extremely simple design.

The .45 caliber Flare Projector (FP-45) has the same external configuration as a normal self-loader. Noticeable features are the large trigger guard, short barrel, and large cocking knob. With the exception of the cocking knob (made of zinc), two spacers, the springs, rivets, and the barrel, all of the components were stamped from a corrosion-resistant steel. The trigger was a folded piece of sheet metal, and the

FIGURE 18–9. Eight stages in the machining of the Modèle 1900 pistol frame. ***(Fabrique Nationale)***

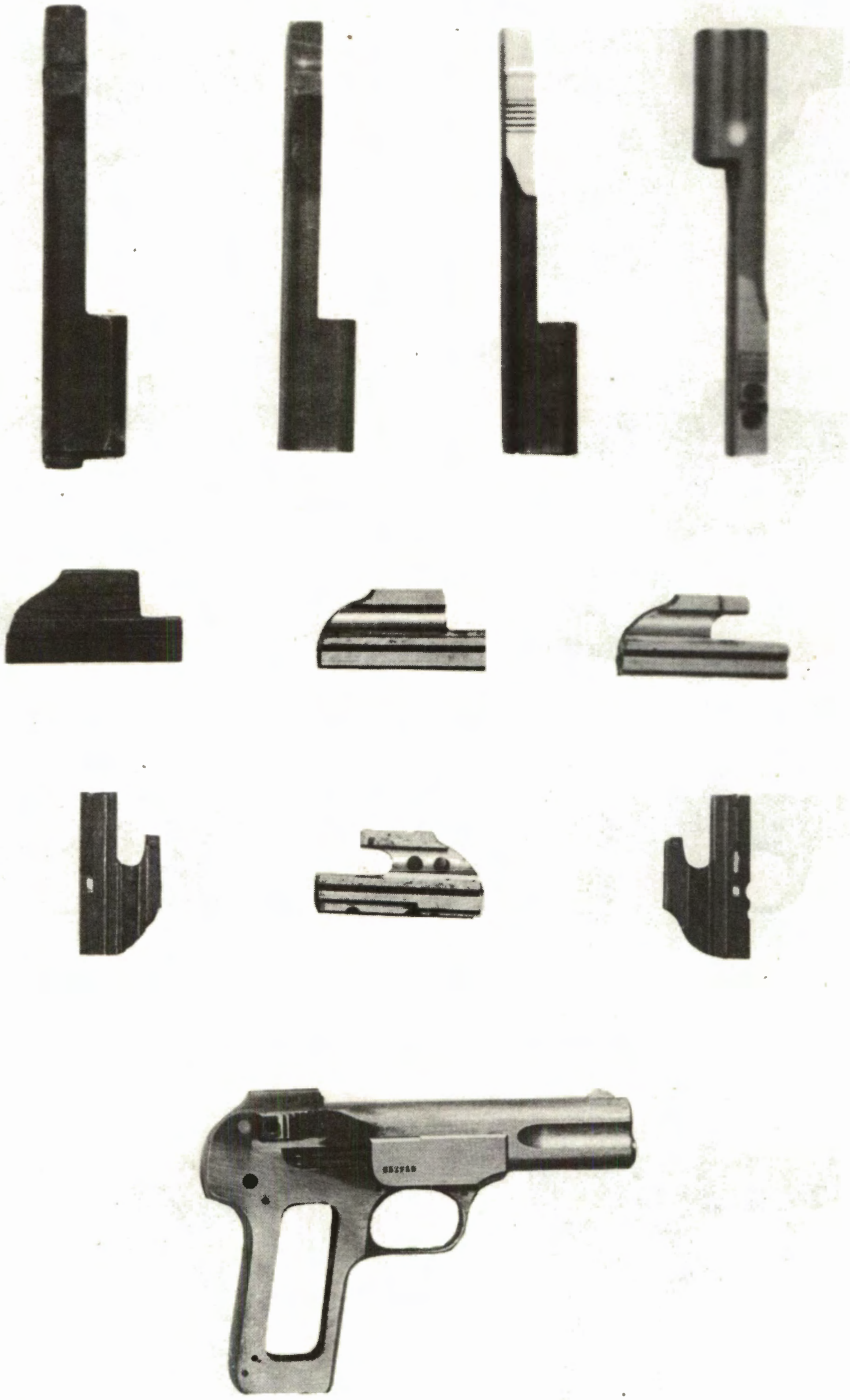
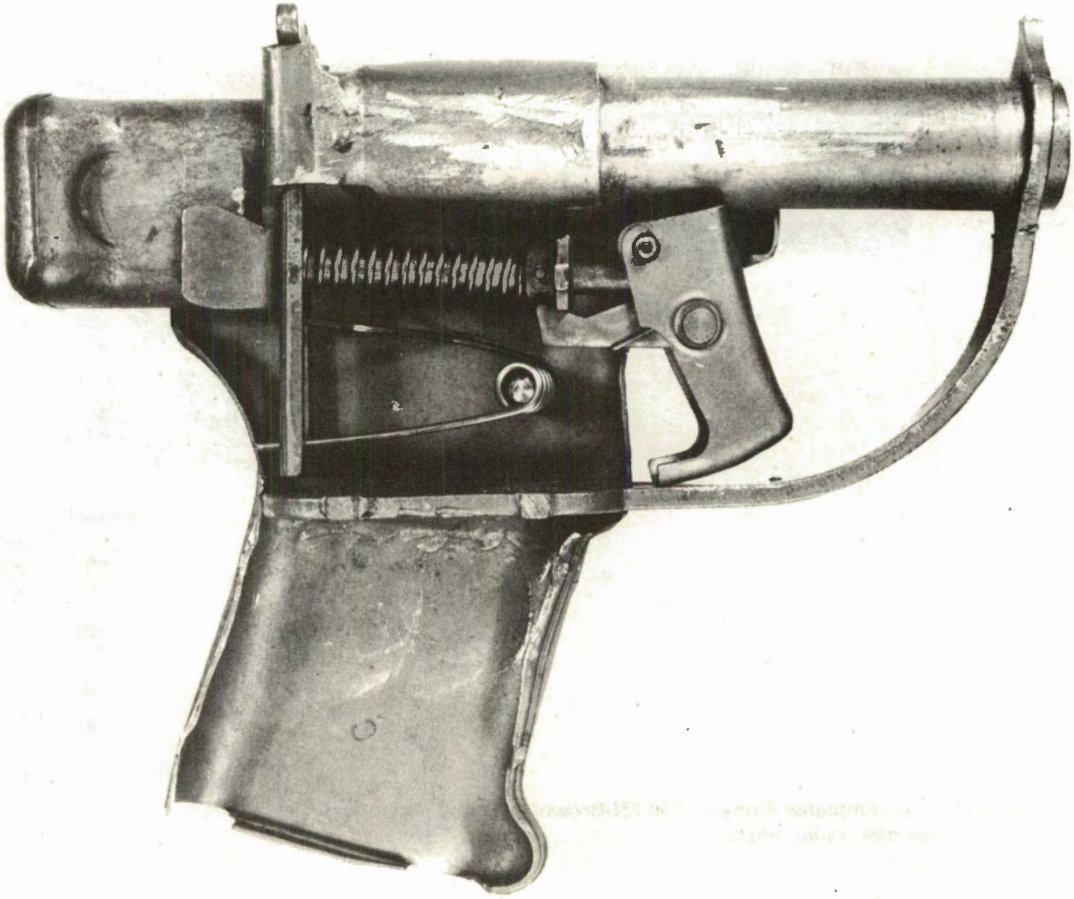


FIGURE 18–10. Stages in the machining of the slide and side plate of the Modèle 1900 pistol. Below is a partly completed Modèle 1900, serial number 632,719. *(Fabrique Nationale)*

FIGURE 18–11. A completed Modèle 1900 FN-Browning pistol, serial number 623,747. ***(Fabrique Nationale)***

FIGURE 18–12. Two views of the .45 caliber (11.43mm) Flare Projector (Liberator). This little handgun had a 122mm barrel, was 140mm overall and weighed 608 grams. The Liberator had an unrifled barrel and the grip held 10 loose cartridges. *(Krcma & U.S. Army)*



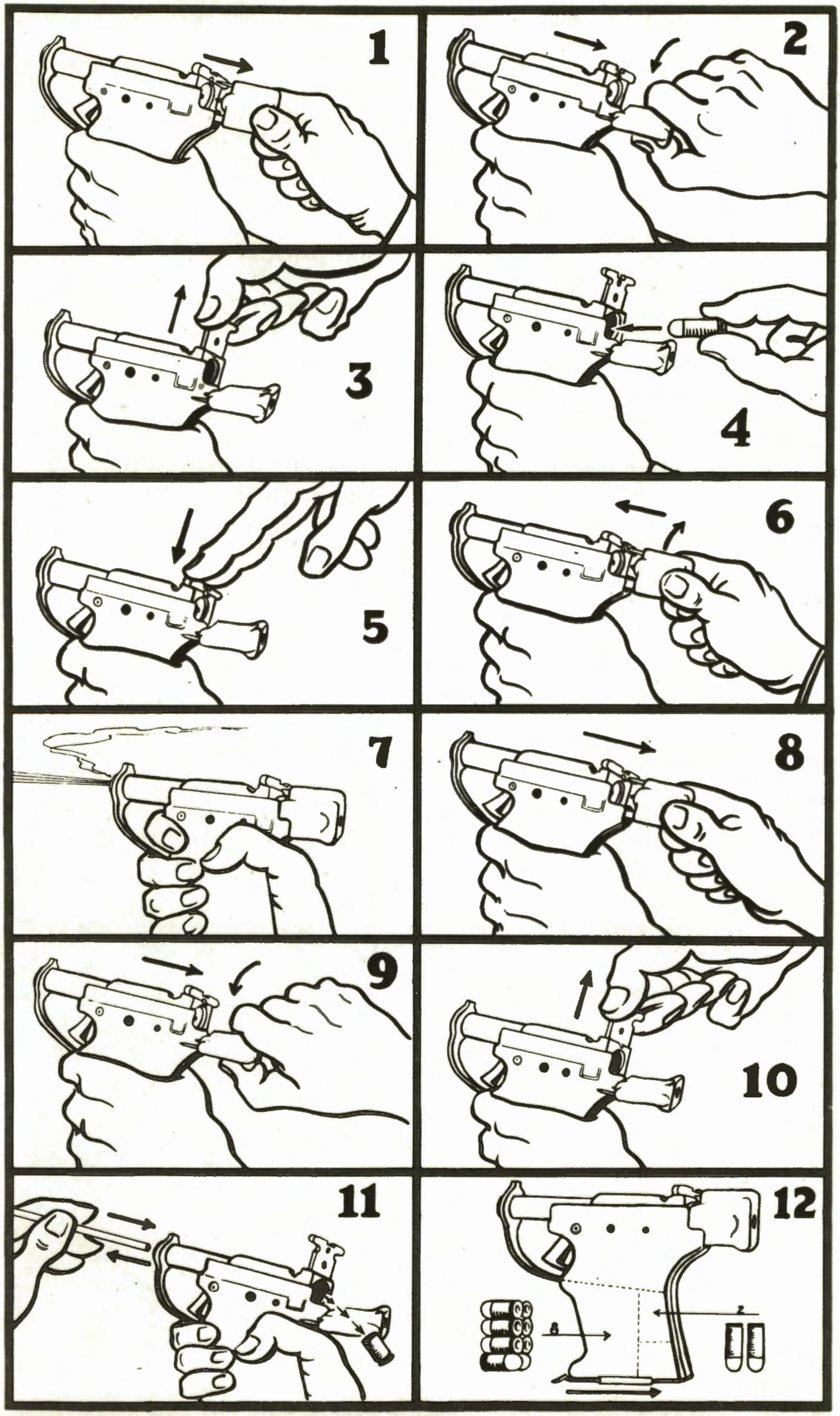


FIGURE 18–13. This wordless instruction manual was drawn to explain the operation of the .45 caliber (11.43mm) single-shot Liberator pistol. *(U.S. Army)*

right and left grip assemblies were the major structural members of this handgun. Some parts served more than one function. The front sight was stamped as part of the trigger guard, and the rear sight was cut into the vertically sliding breech block. There were only 23 parts in the completed handgun. Spot welds held the barrel assembly to the hand grips. These weapons left the factory without serial numbers.

Each Liberator was packaged with an instruction sheet (drawings only), 10 standard .45 caliber (11.43mm) cartridges, and a stick to use as an ejector in a wax-coated, waterproof carton. About half of these pistols were sent to Britain for distribution in Europe; the remainder were shipped to points in the Pacific and China. Only a limited quantity was actually distributed. In Europe, the availability of Sten guns led to the decision to hold these pistols back. Many were dumped into the Irish Sea or melted down for scrap. In the Pacific some quantities were issued, but the recipients were generally skeptical about the safety of firing the Liberator, and most people realized that beyond 2 or 3 meters they were worthless because of the unrifled barrel. The Flare Projector project was more significant as a demonstration of technological capability than it was as a military weapon development.

There were additional experiments with stamped sheet-metal handguns in the United States during the war. One was a two-shot version of the Liberator; the other was a sheet-metal rendition of the Model 1911A1 pistol. While neither of these were manufactured in any numbers, they did indicate the versatility of the technology. Construction of the sheet-metal Model 1911A1 was similar to that of the *Volkspistole* developed by the German arms makers.[4]

Volkespistole

The German government established a program to develop and mass produce a family of inexpensive, easily fabricated weapons for issue to the *Volkssturm* (People's Army) in the last ditch defense of the crumbling Reich. Both bolt action and self-loading Volksgewehr reached the manufacturing and issue stage, but the Volkspistole projects never got beyond the building of prototypes. Nevertheless they did demonstrate the promise sheet-metal stampings had when applied to handgun manufacture. The basic requirements set for the Volkspistole included use of the 9mm Parabellum cartridge, sufficient accuracy to hit a 200mm-by-200mm square at 15

FIGURE 18–14. An experimental stamped-steel rendition of the Colt-Browning Model 1911 pistol. This specimen, located at the Springfield Armory Museum, was one of about a dozen samples made. These stamped-steel pistols were considerably heavier than the standard Model 1911A1; 1,444 grams vs 1,057 grams. *(Krcma)*

FIGURE 18–15. This Mauser HSc was fabricated with a stamped sheet metal slide. It was assigned serial number 000. *(Visser)*

FIGURE 18–16. This Volkspistole has traditionally been identified as having been made by the Gustloff Werke of Suhl. It is possible that it is instead the Mauser Volkspistole prototype. This pistol had a 130mm barrel (206mm with unrifled barrel extension), was 286mm overall, and weighed 960 grams. The barrel was rifled 6-right. *(Hogg and Weeks)*

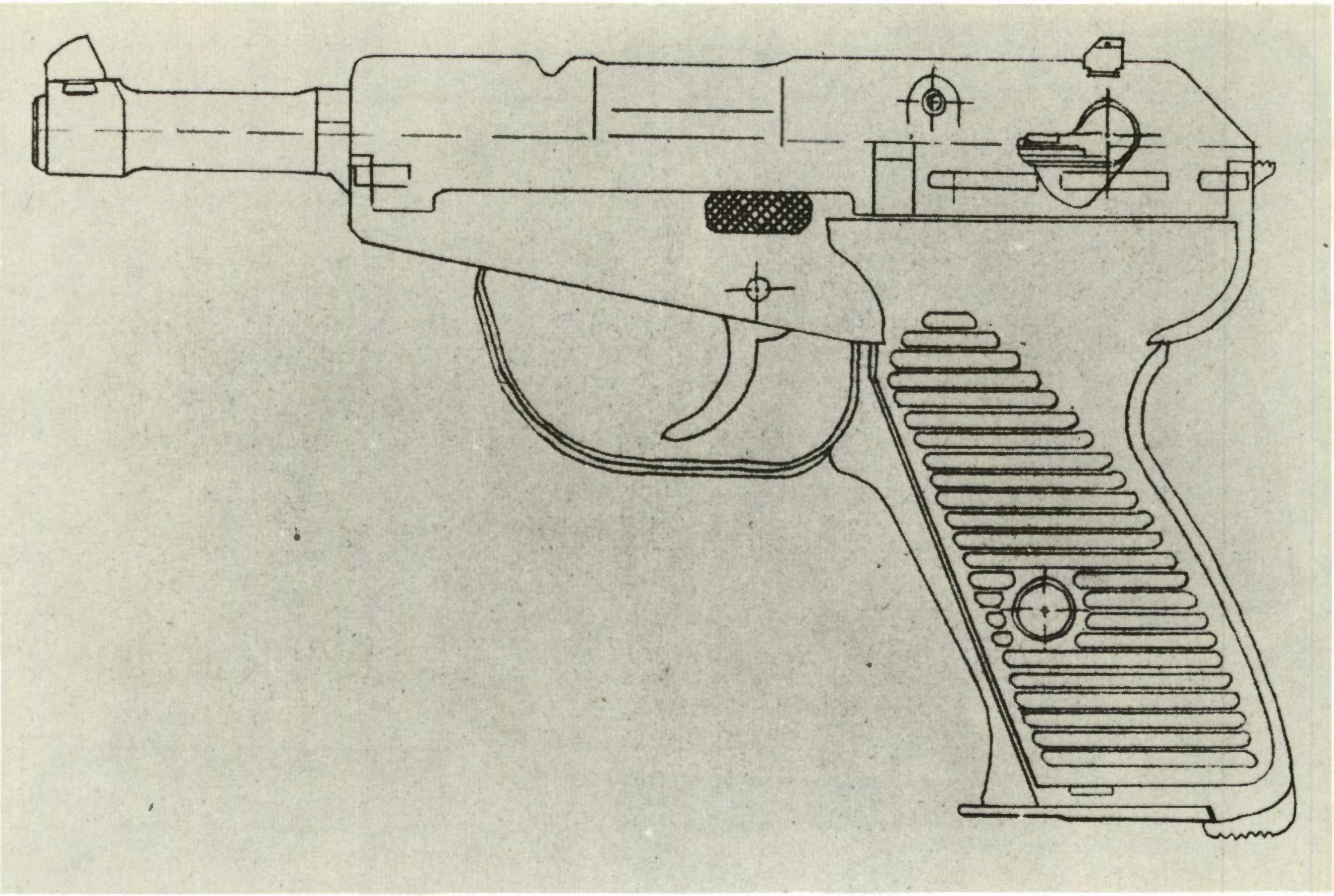


FIGURE 18–17. A Mauser drawing of the *Pistole 9mm Parabellum Gerät 40* dated 15 February 1944. This pistol was not completed at the time the Mauser factory was occupied by French troops in April of 1945. *(Krcma/Mauser)*

meters, and reliable functioning. It was also expected that these handguns would be safe to use, so as not to unnecessarily jeopardize the individual shooting it. Mauser, Walther, and the Gustloff Werke of Suhl are reported to have been involved in the development of the Volkspistole. The handgun usually identified as the Gustloff model may actually have been the Mauser Volkspistole.

MAUSER VOLKSPISTOLE During the war, Mauser engineers experimented with sheet-metal assemblies for handguns. Among the specimens that survived the war, there is a Mauser HSc with a pressed-metal slide. After the war, Alex Siedel, one of the founders of Heckler & Koch, GmbH of Oberndorf, continued to work on sheet-metal handguns resulting in the *HK 4* pistol, a stamped-steel version of the HSc. During 1944 and 1945, Mauser's engineers—including Siedel, Altenburger, and Starnaans—created two different 9mm pistols; the *Gerät 26 Volkspistole* and the *Gerät 40 Pistole mit Fallauf.*

The Mauser Volkspistole was a blowback-type with a pull through trigger mechanism; there was no provision for single-action cocking. It used a P 38 8-shot magazine, weighed 1,070 grams, and had no mechanical safeties. The frame for the Mauser Volkspistole consisted of right and left halves stamped from mild steel plate. (One of the requirements was the elimination of dependence on alloy steels and good quality cold drawn steels.) The slide was also formed from sheet metal, and it housed a machined breech block that was held in place by a cross-pin. Most of the other parts were stampings or were fabricated on general purpose machinery. As in the American Liberator pistol, the two halves of the frame were held together by welding or brazing.

Mauser's design team also was working on another handgun at the end of the war, which was supposed to be easier to manufacture than the P 38. Officially designated the *Gerät 40 Prägueausführung* (Experimental Equipment no. 40), this design had a variant of the Browning-type locking system in which the barrel engaged cutouts in the roof of the slide. After the barrel and slide recoiled a short distance together, the barrel dropped, thus allowing the slide to travel freely to the rear. The safety mechanism was borrowed from the HSc pistol. Since this was a locked-breech weapon, the weight could be less than the heavier, pure blowback Volkspistole (850 grams versus 1,070 grams). Like the Volkspistole, the Gerät 40 employed the P 38 magazine. Fabrication processes and assembly techniques for the Gerät 40 were the same as those employed for the Volkspistole.[5]

FIGURE 18–18. This 9mm Parabellum experimental, sheet-metal pistol was developed by Walther about 1937 or 1938. *(Nonte)*

WALTHER EXPERIMENTAL PISTOLS As with most manufacturers, the designers at Walther continued to experiment with handgun designs after the adoption of their Pistole 38. Some years before the war, perhaps in 1937, the Walther engineers created a variant of their second model MP handgun. This design was interesting because it had a stamped sheet-metal frame and slide. As with the Mauser Volkspistole of 1944 vintage, the experimental Walther design had a frame composed of two halves that were welded together. Unlike the MP (second model), which had a sliding locking block, and the HP and P 38, which had dropping blocks, this sheet metal pistol had two locking pieces (one on either side of the barrel) that were pivoted in the front and that moved horizontally to lock the barrel and the slide together. While this system appears to have been unsatisfactory in the sheet-metal handgun, Walther's engineers later used a variant of it in a self-loading rifle.

Late in the Second World War, Walther engineers developed two additional handguns. One had a rotating barrel-type locking system, similar in concept to the Steyr Modell 1911 or the Czechoslovakian vz.24. The other had a swinging link-locking system similar in concept to the Model 1911 Colt-Browning. In the first of these experimental pistols, the slide was machined from steel, but the breech block and the lock-

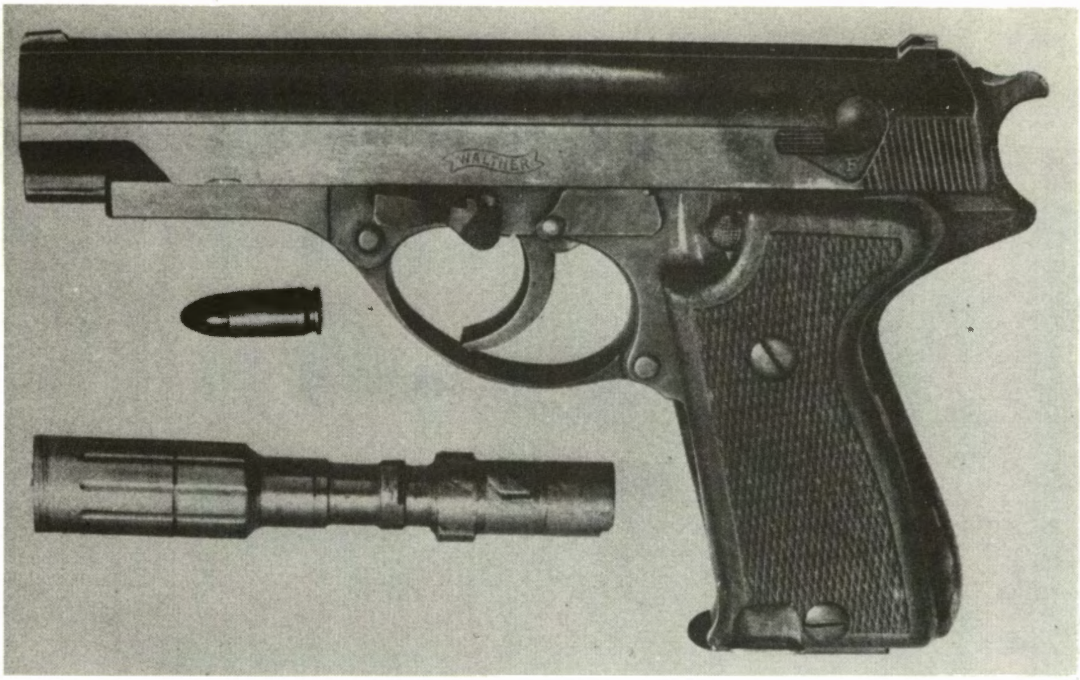


FIGURE 18–19. Walther's experimental 9mm Parabellum pistol with the rotating barrel-locking system. This pistol was fabricated circa 1944. *(Nonte)*

ing block were separate components that could be manufactured with greater ease out of the slide and then pinned into place. This handgun had a P 38 trigger, hammer, and safety system, and it was generally regarded as a technically sound design.

Walther's second 9mm Parabellum pistol of 1944 vintage was fabricated from sheet-metal stampings and was more directly aimed at satisfying the Volkspistole requirement. This design combined some of the best elements of the Colt-Browning Model 1911 pistol and the Walther 38. A double-action handgun, this second experimental handgun would probably have been cheaper to manufacture than the rotating barrel model, because of the use of stamped parts.

In late 1941, Walther undertook the development of a blowback pistol for the Luftwaffe. This handgun, which looked like a small P 38, but which was more closely akin to the PP, was chambered to fire the 9 × 18mm "Ultra" cartridge. By the time the development of this handgun had reached the point where it could have been placed into production, the demand was for cheaper 9 × 19mm Parabellum handguns. This development is notable because the 9 × 18mm cartridge was revived in the postwar period for use in their Makarov and Stetchkin pistols. The Makarov is little more than an enlarged version of the Walther PP.[6]

GUSTLOFF WERKE VOLKSPISTOLE The Gustloff Werke was best known for its manufacture of the MG 34 and MG 42 light machine guns. The pistol attributed to them matches the description of the Mauser Volkspistole, with the exception of the fact that it reportedly had a gas retarding system similar to that used on the Volkssturm Gewehr 1–5 designed by Barnitzke, an engineer employed at the Gustloff Werke. Again the pistol is primarily interesting because of its demonstration of the manner in which the steel-stamping technology could be applied to the manufacture of handguns.

In addition to the Americans and the Germans, the Finns also experimented with sheet metal stampings for handgun components. Their experimental m/44 pistol (described in chapter 15) was also a World War II project, and it also was terminated with the end of the war.

Postwar Production

Following the Second World War, most handgun manufacturers relied upon the traditional manufacturing techniques. Sheet metal technology was largely ignored until Heckler & Koch introduced its HK 4 pistol in the late 1960s, followed by their P 9 series in the early 1970s. The Schweizerische Industrie Gesellschaft introduced their P 220 handgun series in the late 1970s, a weapon that had a sheet-metal slide. Economics was the main consideration in the failure of the major arms manufacturers to exploit sheet metal technology after the war. Reduced production requirements led most firms to retain their existing machine tools and manufacturing processes. Improvements in production equipment were slow, and generally new technology was introduced only when obsolete equipment wore out. Heckler & Koch, which entered the firearms business in the late 1950s, tooled up from scratch, and thus had their choice of production technologies. Firms such as Colt suffered from the fact that they were saddled with reasonably good machinery that became less competitive with each passing year. Still the scale of their handgun production did not justify a wholesale overhaul and modernization of their manufacturing equipment.

The handguns developed in the postwar period generally were refinements of concepts dating before 1945. Heckler & Koch's P 9 series and the Czechoslovakian vz.52 used roller locked barrel and slide systems. While this concept was new to handguns, it was evolved from the Sturmgewehr 45

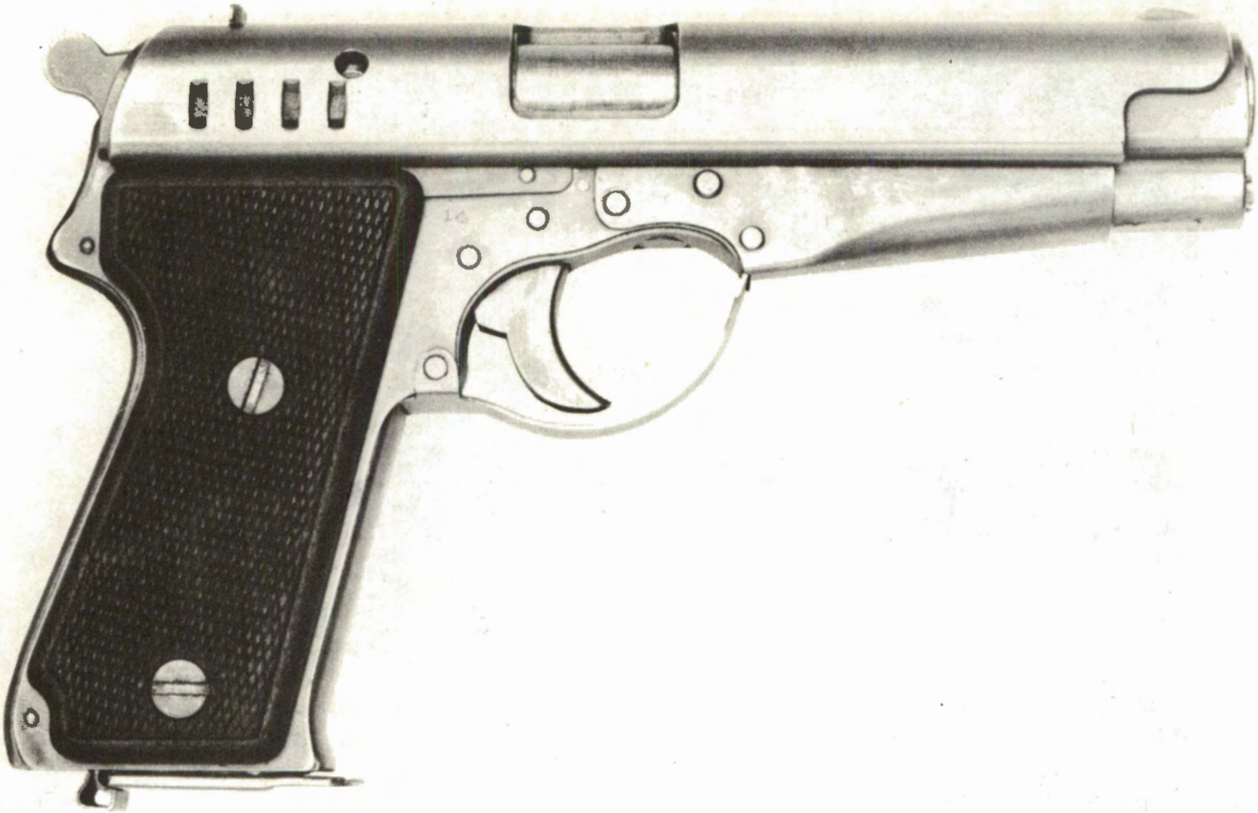


FIGURE 18–20. This experimental, sheet-metal Walther 9mm Parabellum pistol, serial number 14, had a locking system derived from that of the Colt-Browning Model 1911 pistol. *(Visser)*

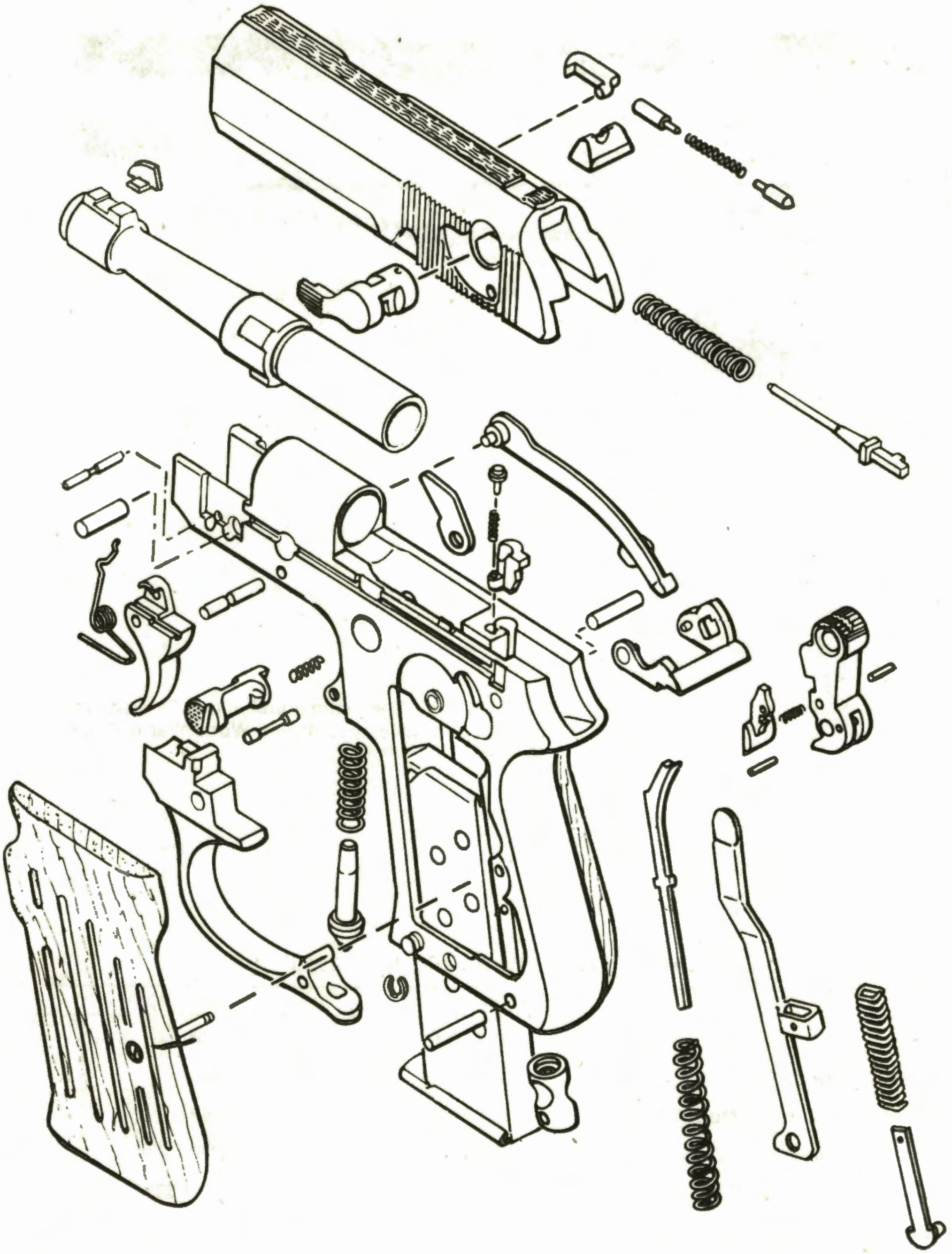


FIGURE 18–21. Walther experimented with this 9 × 18mm Ultra blowback pistol in the early 1940s after a request from the Luftwaffe for a handgun that was more powerful than the 7.65mm and 9mm Kurz caliber PP. *(Hoffschmidt)*

breech mechanism developed at Mauser during the war. The reduced importance of the handgun in the military arsenal also worked against major innovations in either these weapons or the technology used to manufacture them.

At the end of the 1970s, the U. S. Army began to seek a replacement for the Model 1911A1 Colt-Browning pistol, which has seen over 68 years continuous service. In 1980, the German Bundeswehr adopted a new handgun—the Heckler & Koch P 7—to replace the P 1, the postwar version of the P 38. Throughout NATO, the Modèle 1935 GP Browning-Saive pistol was still one of the most popular side arms ever issued. The Soviet Makarov, as noted above, was little more than an enlarged Walther PP chambered to fire the 9 × 18 Makarov (Ultra) cartridge. The Makarov has been manufactured in the Soviet Union, Poland, and the German Democratic Republic. Many older handguns, such as the Tokarev TT 30-33, still remained in service around the world. Thus, one is forced to conclude that the "golden-age" of handgun design was between the years 1870 and 1945. There will always be new proposals for handguns, and new handguns will be adopted, but it is unlikely that the flurry of inventive activity that existed between 1870 and 1945 will ever be seen again.

FIGURE 18–22. The 9mm Parabellum Finnish m/44 experimental sheet metal handgun developed during World War II. *(Tokol)*

TABLE 18-1 SELECTED COST DATA FOR MILITARY HANDGUNS 1895–1945[1]

Model	*1895–1900*	*1915–1920*	*1940–1945*
Borchardt C93, 7.65mm	$15.00 to $17.50	NP	NP
Borchardt-Luger, 7.65mm Para. 1899	$19.30	NP	NP
Borchardt-Luger, 7.65mm Para. Swiss Mod. 1900	$11.96	NP	NP
Borchardt-Luger, 7.65mm Para. U. S. trial model	$14.75	NP	NP
Swiss Ordonanzpistole 06 (Luger), 7.65mm Para	NP	$43.33[2]	NA
Pistole 08, 9mm Para. (Luger Parabellum)	NP	$13.58	$14.00
Mauser M/96. 7.63mm with stock	$22.00 to $25.00[3]	$14.77	NP
Mauser M/96, 9mm Para. with stock	NP	$19.77	NP
Mauser HSc, 7.65mm	NP	NP	$8.50
Pistole 38, 9mm Para. (Mauser)	NP	NP	$12.40 to $12.80
Colt Model 1894 series New Army Revolvers, .38	$12.00	NP	NP
Colt Model 1900 Self-loading Pistol, .38	$20.00 to $25.00	NP	NP
Colt Model 1909 New Service Revolver, .45	$13.00[4]	NP	NP
Colt Model 1911, .45	NP	$14.50	NA
Webley Mark I, .455	$14.50	NA	NA

Notes: NP – not in production in this period; NA – data not available
1. Government purchase price
2. As of 1929
3. Commercial price ca. 1902
4. Price in 1910

NOTES

1. *Greenwood & Batley Equipment Catalog* (Leeds: Greenwood & Batley, Limited, ca. 1892–1897).

2. Robert A. Howard, "Interchangeable Parts Re-examined: The Private Sector of the American Arms Industry on the Eve of the Civil War," *Technology and Culture*, 19 (October, 1978): 633–649.

3. "The Manufacture of the Colt Navy Revolver, Model 1895," *Iron Age*, 59 (27 May 1895): 1–5.

4. R. W. Koch, *The FP-45 Liberator Pistol, 1942–1945* (Long Beach, CA: Research, 1976).

5. Only a few records about the work on the Volkspistolen appear to have survived the Second World War. This section is based upon three basic sources: Combined Intelligence Objectives Sub-committee, *Visit to Mauser Werke A.G. Oberndorf Am Neckar and Mauser Personnel at Lager Haiming Otzal, Near Innsbruck* (London: CIOS, 1945), pp. 55, 147–148 and 182–183; Ian V. Hogg and John Weeks, *Pistols of the World* (London: Arms and Armour Press, 1978), pp. 253–254; and J. Howard Mathews, *Firearms Identification*, Vol. 1 (Springfield, IL: C. C. Thomas, Publisher, 1962), pp. 237–238.

6. E. J. Hoffschmidt, *Know Your Walther p.38 Pistols* (Stamford, CT: Blacksmith Corp., 1974), pp. 19–20; and E. J. Hoffschmidt, *Know Your Walther PP and PPK Pistols* (Stamford, CT: Blacksmith Corp., 1975), p. 36.

19 Military Handgun Cartridges 1870–1945

An extraordinarily large variety of military handgun cartridges were used between 1870 and 1945. To add to the confusion that this variety created, there was a confusion of designations from country to country, which was complicated even further by the existence of two sets of measurements—metric and English. This chapter will explain and identify this variety of cartridges. Although it is not a comprehensive guide, most of the important military cartridges are included. For additional sources of information, see the list at the end of this chapter.

The photographs in this chapter are slightly enlarged, but the line drawings represent the cartridge's actual size. All bullet weights and velocities are representative and should not be considered exact, as these factors varied many times during the years of the cartridge's manufacture.

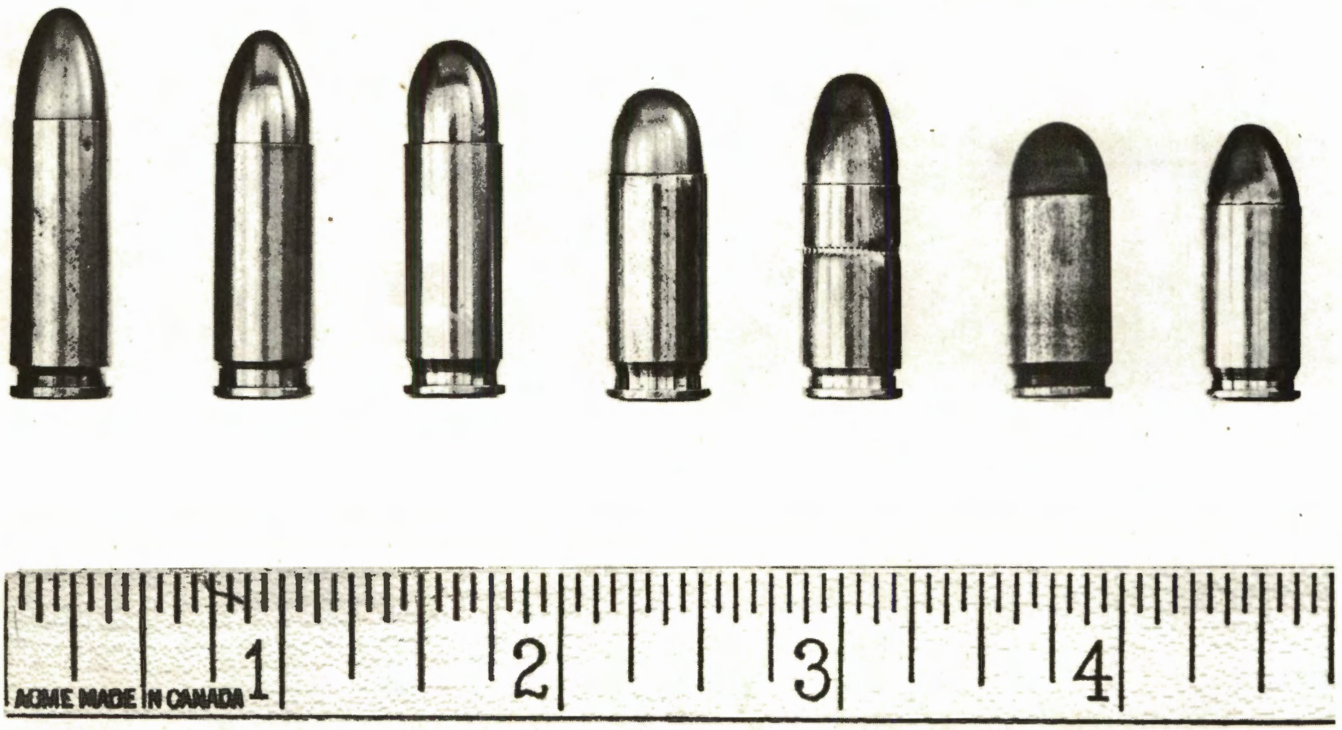
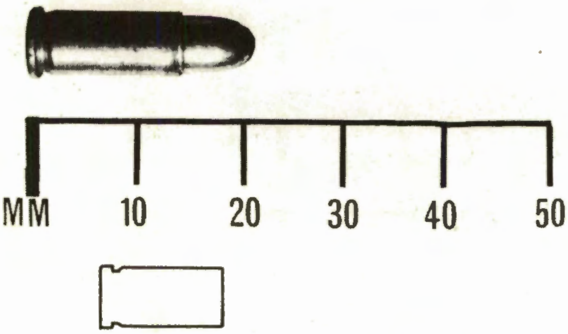


FIGURE 19–1. An example of the variety of cartridges available in the same basic caliber. All the cartridges pictured here are 9mm. *Right to left*: 9mm Mauser (9 × 25mm); 9mm Largo/Bergmann-Bayard/Steyr (9 × 23mm); 9mm ACP Super Automatic (9 × 23mm SR); 9mm Browning Long (9 × 20mm SR); 9mm Parabellum (9 × 19mm); 9mm Makarov, post-1945 (9 × 18mm); and 9mm Browning/Short/Kurz/Corto (9 × 17mm). *(Krcma)*

6.35 x 15mm SR

SYNONYMS **6.35mm Browning Auto**
6.35 x 15mm
.25 ACP
.25 Auto

This cartridge originated in Belgium in 1906 for use in the Browning Modèle 1906 self-loading pistol. It has been manufactured in many countries for both commercial and military use. As a military cartridge, the .25 ACP has distinct limitations, being very underpowered. Its primary military use, a noncritical one, has been with such weapons as staff officers' side arms.



6.35x15SR

Fig. 19–2.

CARTRIDGE DETAILS

Case length—15.5mm (case is straight-sided and semi-rimmed)
Overall cartridge length—22.8mm
Bullet weight—3.2 grams
Muzzle velocity—usually 225 to 260 meters per second

7 x 19.7mm

SYNONYM **7mm Nambu Auto Pistol**

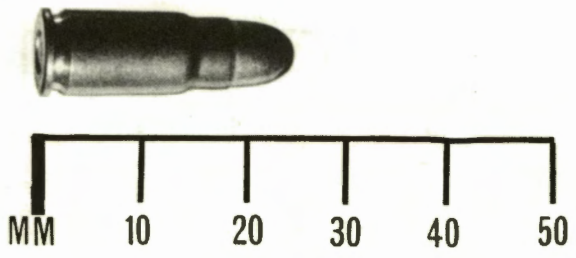


Fig. 19–3.

This cartridge was made and used only by Japan before and during World War II in the Baby Nambu automatic pistol.

CARTRIDGE DETAILS

Case length—19.7mm (case is rimless and bottlenecked)
Overall cartridge length—27mm
Bullet weight—3.6 grams
Muzzle velocity—335 meters per second

7.5 x 22.3mm R

SYNONYMS **7.5mm Ordonnanzrevolver Modell 1882**
7.5mm Swiss Nagant Revolver

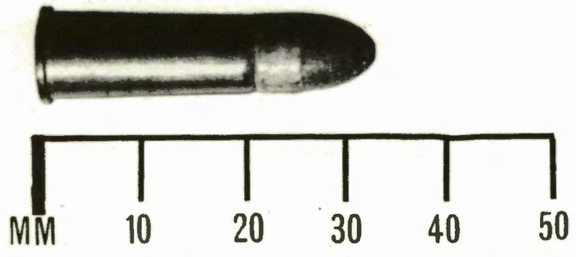


Fig. 19–4.

This cartridge was the official round for the Swiss army revolver from 1882 until it was phased out of service in the early years of this century. The 7.5mm revolver cartridge was loaded at first with black powder and later with smokeless powder. Lead bullets were used at first and later they were replaced by jacketed bullets. The case of the 7.5mm Swiss is very similar to that of the 7.5mm Swedish Nagant cartridge.

CARTRIDGE DETAILS

Case length—22.3mm (case is rimmed and has a straight taper)
Overall cartridge length—33.4mm
Bullet weight—6.8 grams
Muzzle velocity—215 meters per second

7.5 x 22.4mm R

SYNONYMS **7.5mm Norwegian Revolver**
7.5mm Swedish Model 1887 Revolver

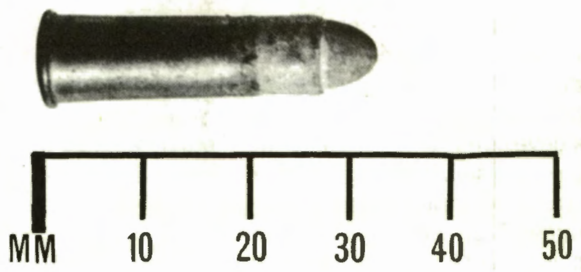


Fig. 19–5.

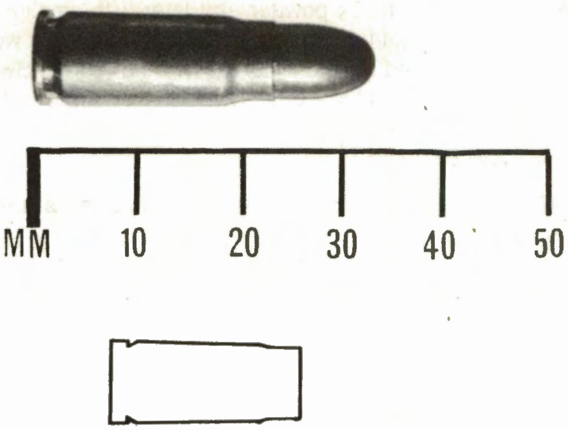
This cartridge, introduced in 1887, was in common service in Sweden and Norway until the early part of this century. The cartridge case is very similar in size and shape to the 7.5mm Swiss, but it is usually found only with lead bullets.

CARTRIDGE DETAILS

Case length—22.4mm
Overall cartridge length—34.7mm
Bullet weight—6.5 grams
Muzzle velocity—223 meters per second

7.62 x 25mm

SYNONYMS **7.63mm Mannlicher, Model 1896 or 1903**
7.65mm Mannlicher Carbine, Model 1896 or 1901
7.65mm Borchardt Model 1893
.30 Mauser
7.63mm Mauser
7.62mm Type P (Soviet)
7.62mm Tokarev Model 1930



7.62x25

Fig. 19–6.

Made available in 1893, this durable cartridge was used in the Borchardt self-loading pistol, the design forerunner of the Luger pistol. With only minor variations in bullet weight and propellant charges, this cartridge was also used in the Models 1896, 1901, and 1903 Mannlicher pistols and pistol-carbines. The same case but with a distinctly heavier load was developed for the 7.63mm Mauser Model 1896 military automatic pistol. In 1930, the Soviet Union adopted the Mauser cartridge under the designation 7.62mm Type P for the Tokarev TT-30 and TT-33 automatic pistols and later for the Models PPD-40, PPSh-41, and PPS-43 submachine guns. Although no longer used by Soviet military forces, these weapons are still found in eastern Europe and elsewhere. Other military weapons designed for this cartridge were the German Model 1932 machine pistol, the PRC Type 51 and 54 pistols and Type 50 and 54 submachine guns, the Czech Model 24 and 26 submachine guns and Model 52 pistol, the Polish Model 1943/52 submachine gun, the Hungarian Model 48 submachine gun, and the Spanish Astra Model 900 and 903 pistols.

CARTRIDGE DETAILS (TOKAREV)

Case length—24.85mm (case is rimless and bottle-necked)
Overall cartridge length—34.7mm
Bullet weight (jacketed ball bullet, Type P)—5.5 grams
Muzzle velocity—457 meters per second

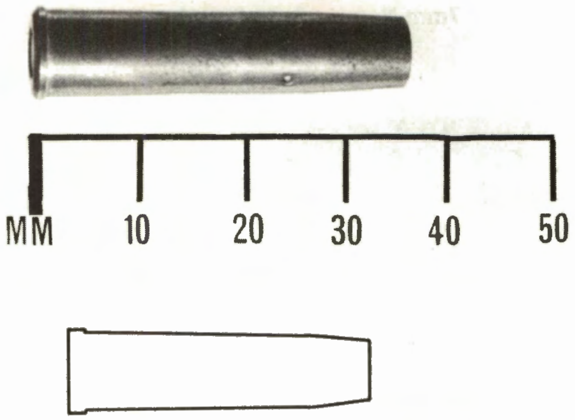
CARTRIDGE DETAILS (MAUSER)

Case length—24.8mm
Overall cartridge length—34.7mm
Bullet weight—5.2 to 5.95 grams
Muzzle velocity—443 meters per second

7.62 x 39mm R

SYNONYM **7.62mm Nagant Revolver**

This round was introduced into the Imperial Russian Army in 1895 for use in the Nagant revolver, the standard Russian pistol until 1930. It remained in service until well after World War II and has been used in recent years as a match cartridge. Manufactured in a number of countries, it is unusual in that the bullet is entirely concealed within the case.



7.62x39R

Fig. 19–7.

CARTRIDGE DETAILS

Case length—38.5mm (case is rimmed and may be either straight-tapered or bottlenecked)
Overall cartridge length—38.5mm
Bullet weight (jacketed)—6.9 grams
Muzzle velocity—290 meters per second

7.63 x 27.5 mm

SYNONYMS **7.63mm Mannlicher Auto Pistol**
7.63mm Mannlicher Model 1900

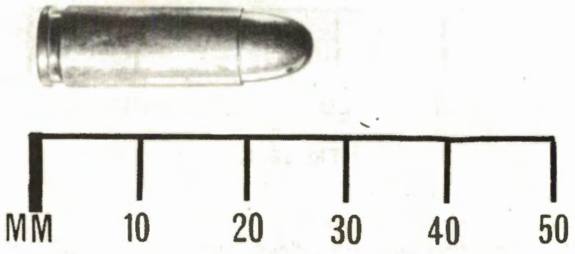


Fig. 19–8.

This cartridge was first introduced for the Model 1900 Mannlicher automatic pistol in Austria. Although not used as a standard arm by any European army, the weapon was adopted by Argentina, where the ammunition was also manufactured.

CARTRIDGE DETAILS

Case length—21mm (case is straight-sided and rimless)
Overall cartridge length—27.5mm
Bullet weight—5.5 grams
Muzzle velocity—305 meters per second

7.62 x 17mm SR

SYNONYMS **7.65mm Browning Auto**
7.65 x 17mm
.32 ACP
.32 Auto

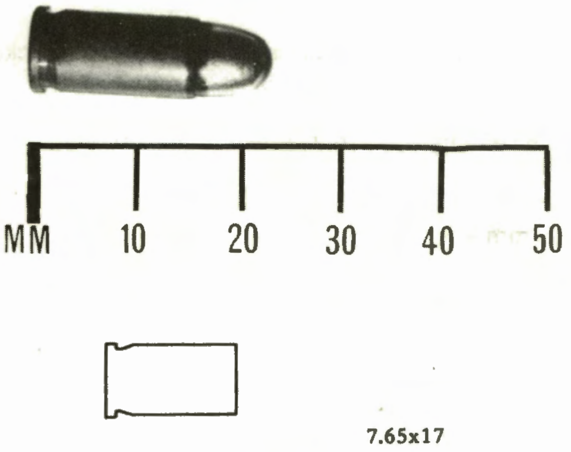


Fig. 19–9.

Developed at the turn of the century for use in the pocket automatic pistols designed by John M. Browning, the 7.62 x 17mm SR has retained its popularity to this day. The full metal-jacketed bullet can range in weight from 4.6 to 5 grams and in velocity from 275 to 366 meters per second, depending on the manufacturer. Practical range does not exceed 15 meters. This cartridge has been produced by numerous manufacturers in many countries.

CARTRIDGE DETAILS

Case length—17mm (case is straight-sided and semi-rimmed)
Overall cartridge length—24.9mm
Bullet weight (standard military)—5 grams
Muzzle velocity—305 meters per second

7.65 x 20mm

SYNONYMS **7.65mm MAS Auto Pistol**
7.65mm French Modèle 1925
7.65mm French Modèle 1938
7.65mm French Long
7.65 L pour Pistolet, 7 .65mm MAS

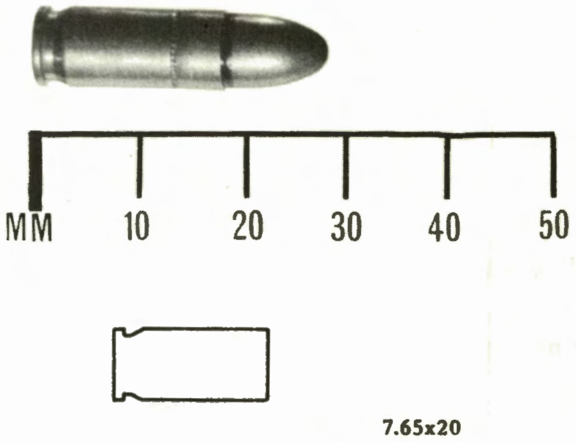


Fig. 19–10.

This cartridge was introduced into French military service in 1935 for the MAS 1935S self-loading pistol, and in 1938 its use was extended to the Modèle 1938 submachine gun, although it was underpowered for this role. The case for this French cartridge is virtually identical to that of the .30 Pedersen cartridge produced in 1918 in the United States for use in an attachment to the Springfield Rifle that allowed it to fire semiautomatically. There is little doubt that the French design was directly influenced by the Pedersen case.

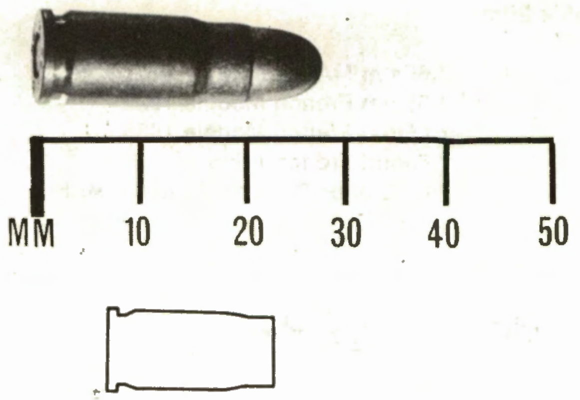
CARTRIDGE DETAILS

Case length—19.7mm
Overall cartridge length—30.3mm
Bullet weight—5.8 grams
Muzzle velocity—300 meters per second

7.65 x 22mm

SYNONYMS **7.65mm Parabellum-Pistole**
7.65mm Swiss Modell 1900
7.65mm Bergmann SMG
.30 Luger

Introduced by Deutsche Waffen- und Munitionsfabriken in 1900, this cartridge first entered military service in Switzerland, when the Swiss army adopted the Model 1900 Parabellum pistol. Later in the 1930s, the Swiss extended the round's versatility by using it in the Bergmann submachine gun. The 7.65 x 22mm cartridge has been made in a number of countries for both civil and military applications.



7.65x22

Fig. 19–11.

CARTRIDGE DETAILS

Case length—21.5mm (case is rimless and bottlenecked)
Overall cartridge length—29.8mm
Bullet weight—6 grams
Muzzle velocity—396 meters per second

8 x 18.5mm

SYNONYMS **8mm Steyr Auto Pistol**
8mm Roth-Steyr
8mm Austrian, Model 1907

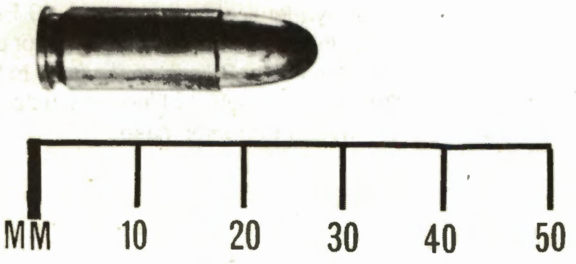


Fig. 19–12.

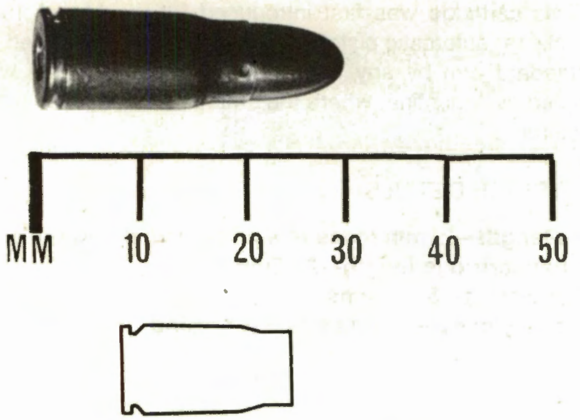
This cartridge was introduced to the Austrian army in 1907 for the Modell 1907 Roth-Steyr self-loader. It was manufactured in a number of countries and is still being made in Italy.

CARTRIDGE DETAILS

Case length—18.5mm (case is rimless and straight-sided)
Overall cartridge length—28.5mm
Bullet weight (jacketed)—7.5 grams
Muzzle velocity—320 meters per second

8 x 21mm

SYNONYMS **8mm Nambu Auto Pistol**
8mm Japanese



8x21

Fig. 19–13.

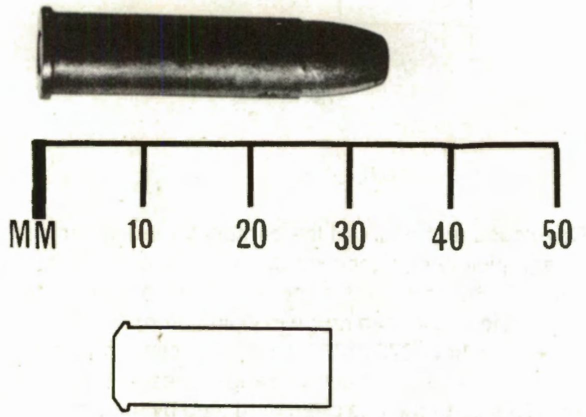
This cartridge was used in the Nambu automatic pistol, the Taisho Type 14 pistol, and the Type 94 pistol. The 8mm cartridge was also used on a limited scale by Japan in the Type 100 submachine gun.

CARTRIDGE DETAILS

Case length—21.3mm (case is rimless and bottlenecked)
Overall cartridge length—31.8mm
Bullet weight—6 to 6.6 grams
Muzzle velocity—305 to 325 meters per second

8 x 27mm R

SYNONYMS **8mm Gasser Revolver**
8mm Austrian Modell 1898 Revolver



8x27R

Fig. 19–14.

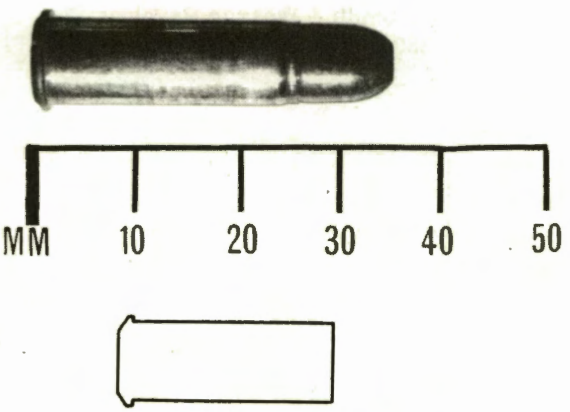
This cartridge was introduced for use with the Modell 1898 Rast revolver issued to Army officers in Austria in 1898. Although long obsolete for military use, the ammunition was made until recently in Italy.

CARTRIDGE DETAILS

Case length—27mm (case is rimmed and straight-sided)
Overall cartridge length—35.5mm
Bullet weight (jacketed)—7.8 grams
Muzzle velocity—245 meters per second

8 x 27mm R

SYNONYMS **8mm Lebel Revolver**
8mm Modèle d'Ordonnance



8x27R

Fig. 19–15.

First appearing in France in the mid-1800s, this cartridge was later used in the French Modèle 1892 ordnance revolver, which remained in service until after World War II. Although in military use only in France and in French dependencies, this 8mm cartridge has been manufactured by a number of European countries.

CARTRIDGE DETAILS

Case length—27.5mm (case is rimmed and straight-sided)
Overall cartridge length—36.4mm
Bullet weight (jacketed)—7.8 grams
Muzzle velocity—220 meters per second

9 x 17mm R

SYNONYMS **9mm Danish Army Revolver**
9mm Danish Model 1891

Introduced in 1891 for the Danish army revolver, this cartridge remained in service until 1940.

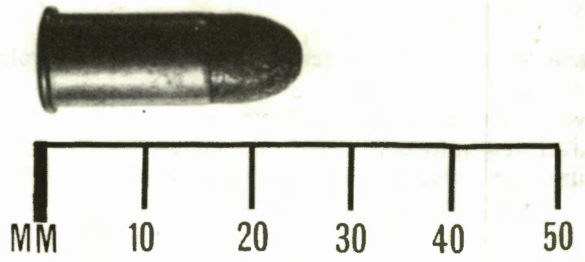


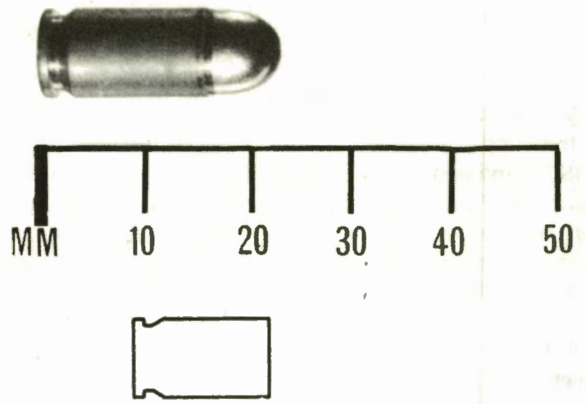
Fig. 19–16.

CARTRIDGE DETAILS

Case length—17.3mm (case is rimmed and straight-sided)
Overall cartridge length—27.3mm
Bullet weight (lead)—8 grams
Muzzle velocity—200 meters per second

9 x 17mm

SYNONYMS **9mm Browning**
9mm Kurz
9mm Corto
9mm Short
9mm Model 1934 Italian
.380 ACP
.380 Auto



9x17

Fig. 19–17.

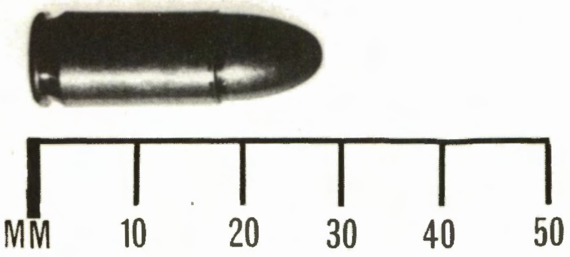
The 9 x 17mm cartridge was introduced in Europe in 1908 as the 9mm Browning Short and in the United States as the .380 ACP. Practical range for this round is 15 to 25 meters. In addition to widespread use in police and self-defense weapons, this cartridge has been utilized in military pistols, notably by Czechoslovakia in several models and by Italy in the Model 1934 Beretta pistols.

CARTRIDGE DETAILS

Case length—17.1mm (case is rimless and straight-sided)
Overall cartridge length—25mm
Bullet weight (round-nosed, jacketed)—6 grams
Muzzle velocity—275 to 310 meters per second

9 x 19mm

SYNONYMS **9mm Parabellum Pistole**
9mm Para
9mm Luger
9mm Glisenti
9mm Pistole Patrone 08



9x19

Fig. 19–18.

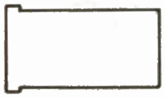
The 9 x 19mm cartridge was introduced in 1904 by DWM for the Luger automatic pistol, adopted by the German army in 1908, and designated the 08. The term "Parabellum," abbreviated "Para" (Latin for prepare for war or protect against war), was the registered trade name for pistols, carbines, and machine guns manufactured by DWM. It also became associated with the 9 x 19mm cartridge. This round has been produced in a variety of bullet weights and propellant loadings. Practical ranges are 25 to 50 meters when fired from a pistol and 75 to 100 meters from a submachine gun. During World War II, bullets with mild steel cores were made by Germany; tracer bullets have been produced by a number of countries, including France, Israel, and Finland. A variety of special-pupose loads, including target, training, signal, and blank cartridges, have been produced over the years. There are two variant types of 9 x 19mm service cartridges. The 9 x 19mm developed by Italy for the Glisenti Model 1910 automatic pistol and also used in other makes and models has one-third less propellant than the standard loading and may not operate automatic weapons designed for a full load; it can be identified by the designation *9-mm Glisenti* in the head-stamp marking. A DWM-developed 9mm Luger carbine cartridge can be identified by its blackened cartridge case and the head-stamp code 480D. Because this cartridge develops a high pressure that could damage a pistol or injure the shooter, its use should be restricted to weapons for which it was designed.

CARTRIDGE DETAILS

Case length—19.1mm (case is rimless and straight-sided)
Overall cartridge length—29.6mm
Bullet weight—5.75 to 8.9 grams
Muzzle velocity—345 to 475 meters per second

9 x 20mm R

SYNONYMS **.38 Smith & Wesson Revolver**
.380 Enfield Revolver



9x20R

Fig. 19–19.

The basic .38 Smith & Wesson cartridge, which originated in the United States in about 1876, has been widely used by police forces and is a popular commercial cartridge. In Britain, it was adopted for military use in 1930 with the Enfield No. 2 revolvers.

CARTRIDGE DETAILS (British military version)

Case length—19.3mm (case is rimmed and straight-sided)
Overall cartridge length—31.5mm
Bullet weight (Mark 1 lead)—13 grams
(Mark 2 jacketed)—11.5 grams
Muzzle velocity——185 meters per second

9 x 20mm SR

SYNONYMS **9mm Browning**
9mm Swedish Model 1907
9mm Browning Long

This cartridge was first produced in Belgium prior to the First World War for a Browning pistol manufactured by Fabrique Nationale. The cartridge had been made in a number of countries, the country last using it for military pistols being Sweden.

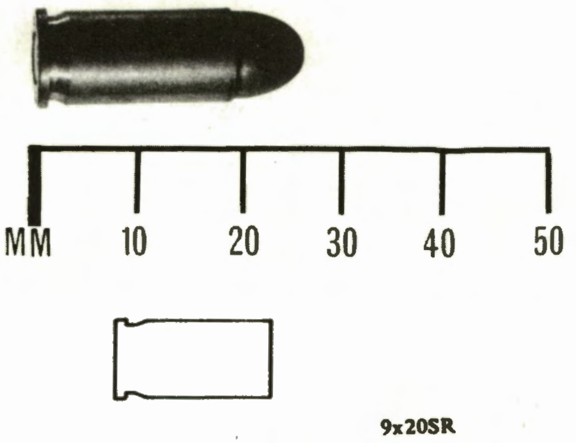


Fig. 19–20.

CARTRIDGE DETAILS

Case length—20mm (case is semirimmed and straight-sided)
Overall cartridge length—27.5mm
Bullet weight (jacketed)—7.1 grams
Muzzle velocity—335 meters per second

9 x 22mm R

SYNONYMS **9mm Belgian Ordonnance Revolver**
9mm Belgian Nagant Revolver
9mm Belgian Model 1878

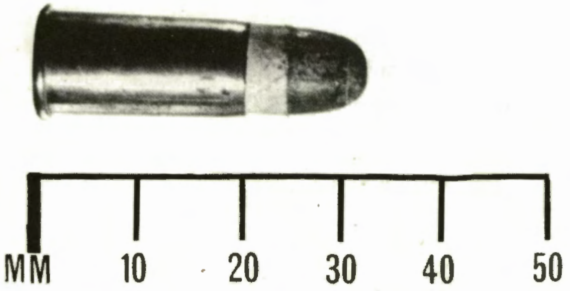


Fig. 19–21.

This cartridge was used by the Belgian army and was also manufactured outside Belgium. The Nagant and Galand revolvers for which the round was intended were largely obsolete by 1914.

CARTRIDGE DETAILS

Case length—22mm (case is rimmed with a slight taper)
Overall cartridge length—34mm
Bullet weight (lead, paper patched)—12 grams
Muzzle velocity—197 meters per second

9 x 22mm R

SYNONYMS **9mm Japanese revolver**
Japanese Type 1893 (Pattern 26)

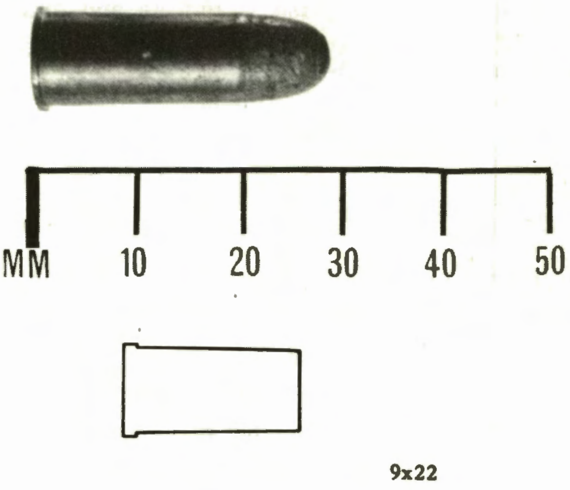


Fig. 19–22.

This cartridge has been made and used only by the Japanese for their double-action ordnance revolver (adopted in 1893 and used through World War II). The cartridge does not bear a head stamp and has a very thin rim.

CARTRIDGE DETAILS

Case length—22mm (case is rimmed and straight-sided)
Overall cartridge length—29.5mm
Bullet weight (lead)—9.7 grams
Muzzle velocity—about 195 meters per second

9 x 22.7mm

SYNONYMS **9mm Steyr Auto Pistol**
9mm Austrian Model 1912

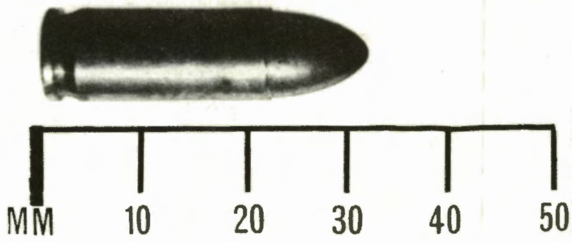


Fig. 19–23.

The Austrian army adopted this cartridge in 1912 for use in their new Steyr Modell 1911 self-loading pistol. The cartridge was also in limited military use elsewhere in Europe.

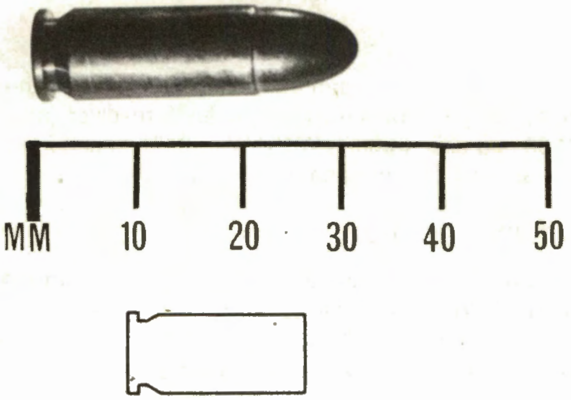
The Austrian MP 34 submachine gun was also chambered for this cartridge. The 9 x 22.7mm is very similar to the 9 x 23mm round.

CARTRIDGE DETAILS

Case length—22.7mm (case is rimless and straight-sided)
Overall cartridge length—32.8mm
Bullet weight (jacketed)—7.5 grams
Muzzle velocity—335 meters per second

9 x 23mm

SYNONYMS **9mm Bergmann-Bayard**
9mm Bayard
9mm Bayard Long
9mm Largo
9mm Bergmann No. 6
9mm Danish Model 1910
9mm Astra m/1921



9x23

Fig. 19–24.

This cartridge was introduced in 1903 for the Bergmann automatic pistol (manufactured in Belgium as the Bergmann-Bayard), which was adopted by the Danish army as a service pistol in 1910. The Spanish Bergmann Modelo 1908, Campo-Giro 1913 and 1913/16, Astra Model 1921, the Star Model A, the Super Star pistols, and the Model Z45 submachine guns all use this cartridge under the 9mm Largo designation. With a bullet weight of from 8 to 8.9 grams and a muzzle velocity of 365 meters per second, this cartridge has a practical range in a pistol of 25 meters and in a submachine gun of 50 meters. Except possibly in Spain, this cartridge is now obsolete for military purposes.

CARTRIDGE DETAILS

Case length--23mm (case is rimless and straight-sided)
Overall cartridge length—33.5mm
Bullet weight (jacketed)—8.2 grams
Muzzle velocity—365 meters per second

9 x 23mm SR

SYNONYMS **.38 ACP**
.38 Super Automatic

9x23SR

Fig. 19–25.

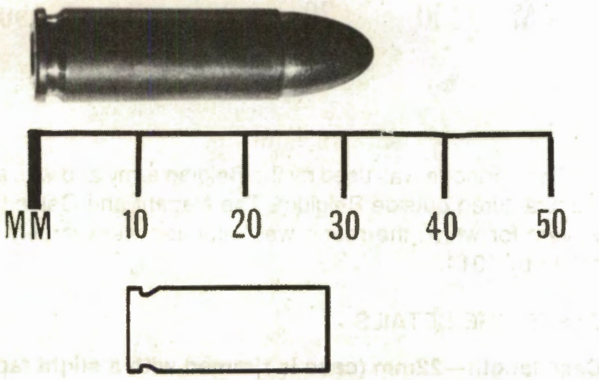
The designation .38 ACP is not to be confused with the .380 ACP designation of the 9 x 17mm Browning Short cartridge; the two rounds are quite different. The 9 x 23mm SR was not developed as a metric-designation cartridge; it was introduced in 1900 by Colt for their Browning-designed .38 automatic pistol. In addition to the Colt, Webley & Scott, Llama, Star and Astra pistols were also chambered for this cartridge. The 9 x 23mm SR cartridge has approximately the same characteristics as the 9 x 19mm Luger cartridge. In 1929, a higher-velocity load using the same cartridge was introduced as the .38 Colt Super Automatic, and head stamps may be found with that designation. Llama, Star, and Astra automatic pistols have also been made for this ammunition.

CARTRIDGE DETAILS

Case length—22.85mm
Overall length—32.5mm
Bullet weight (jacketed)—8.4 grams
Muzzle velocity—(.38 ACP) 317 meters per second
(.38 Super) 389 meters per second

9 x 25mm

SYNONYMS **9mm Mauser Auto Pistol**
9mm Mauser Export
9mm Neuhausen
9.08 x 25mm
Kal 9 Mauser



9x25

Fig. 19–26.

This cartridge originated prior to the First World War when the Mauser company offered the C96 pistol chambered to fire it for the export trade. To that extent, it was really more a commercial than a military cartridge, but during the 1914 to 1918 war it was pressed into service by the Germans. Later, in the 1930s, it was used in the Swiss Neuhausen submachine gun.

CARTRIDGE DETAILS

Case length—25mm (case is rimless and straight-sided)
Overall cartridge length—35mm
Bullet weight (jacketed)—8.1 grams
Muzzle velocity—412 meters per second

9 x 25.6mm R

SYNONYMS **.38 Long Colt Revolver**
.38 Colt Navy
.38 Colt Army

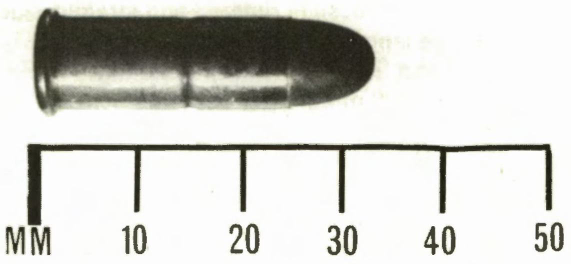


Fig. 19–27.

This cartridge, together with the Model 1889 Colt revolvers chambered for it, was adopted first by the U.S. Navy and then by the U.S. Army (Model 1892 series) before the start of this century. It was subsequently considered underpowered and replaced by the .45 ACP. The actual bullet diameter was about 9.7mm.

CARTRIDGE DETAILS

Case length—25.6mm (case is rimmed and straight-sided)
Overall cartridge length—34.4mm
Bullet weight (lead)—9.6 grams
Muzzle velocity—about 335 meters per second

9 x 26mm R

SYNONYMS **9mm Gasser Revolver**
9mm Austrian Revolver Model 1878
9mm Gasser Kropatschek
9mm Austrian Infantry & Gendarmerie Revolver

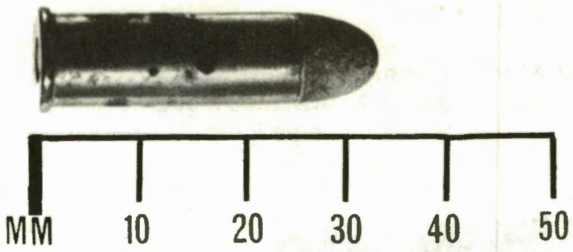


Fig. 19–28.

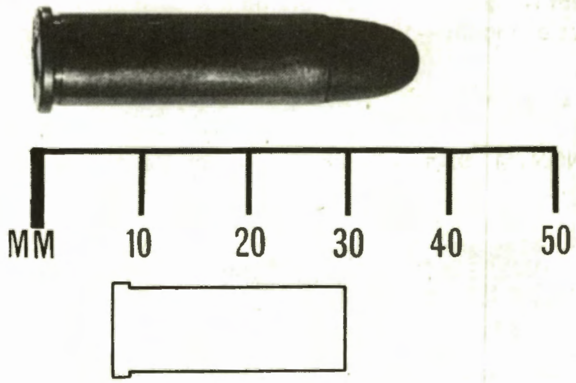
Until superseded by the 8mm Gasser, the 9mm Gasser Revolver, for which this cartridge was used, was adopted as the standard army and gendarmerie revolver of Austria in 1878. The revolver was designed by Kropatschek and Gasser jointly and used only in Austria.

CARTRIDGE DETAILS

Case length—26mm (case is rimmed and straight-sided)
Overall cartridge length—34mm
Bullet weight (lead)—10.2 grams
Muzzle velocity—219 meters per second

9 x 29mm R

SYNONYMS **.38 Smith & Wesson Revolver**
.38 Special M41



9x29R

Fig. 19–29.

This cartridge originated early in the twentieth century. For much of its long life has been a commercial or police round, however, it has been adopted as a military cartridge in a number of countries. In the United States it has been used on a limited basis by the army for a variety of missions, including air crew survival.

CARTRIDGE DETAILS

Case length—29mm (case is rimmed and straight-sided)
Overall cartridge length—39.5mm
Bullet weight (lead)—9.1 grams (M41)
Muzzle velocity—290 meters per second (M41)

9.4 x 20.7mm R

SYNONYMS **9.4mm Dutch Revolver**
9.4mm Netherlands Model 1873
9.4mm Scherpe Patroon No. 5

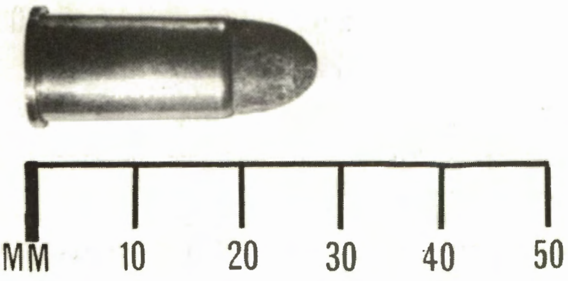


Fig. 19–30.

This is the standard "Home Service" prewar Dutch ordnance revolver cartridge, used in a Chamelot-Delvigne-type revolver. A number of different case forms exist that are of roughly similar length, but there is also a long-case variant for use in the East Indies.

CARTRIDGE DETAILS

Case length—20.7mm (case is rimmed; some variants are slightly bottlenecked; others straight-tapered)
Overall cartridge length—29.2mm
Bullet weight (lead)—12.2 grams
Muzzle velocity—185 meters per second

9.4 x 27mm R

SYNONYM **9.4mm Dutch East Indies Revolver**

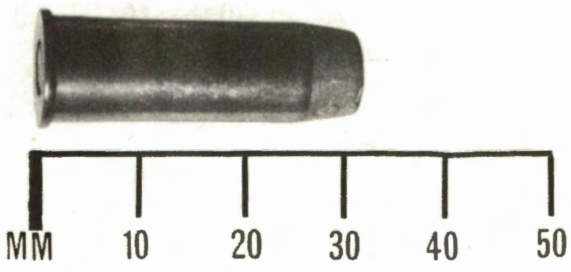


Fig. 19–31.

This cartridge is the long-cased version of the standard Dutch "Home Service" 9.4mm revolver cartridge, intended for use in the Dutch Indies.

CARTRIDGE DETAILS

Case length—27.2mm (case is rimmed and straight-tapered)
Overall cartridge length—32.9mm
Bullet weight (lead)—11.3 grams
Muzzle velocity—unknown

10.4 x 20mm R

SYNONYM **10.4mm Swiss Ordonnanzrevolver Modell 1878**

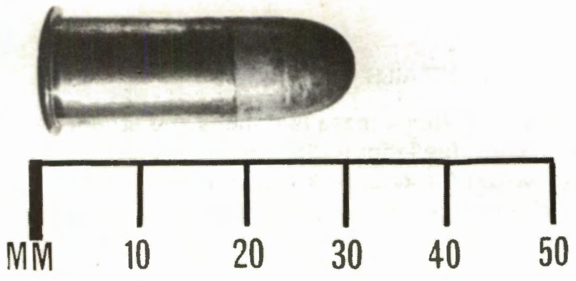


Fig. 19–32.

This cartridge was used only by the Swiss, who adopted it for the Model 1872/78 revolver. This was originally a rimfire revolver (Model 72), converted to center-fire in 1878.

CARTRIDGE DETAILS

Case length—20mm (case is rimmed and straight-sided)
Overall cartridge length—32mm
Bullet weight (lead, paper patched)—12.5mm
Muzzle velocity—183 meters per second

10.4 x 20.2mm R

SYNONYMS **10.4mm Italian Ordnance Revolver**
10.4mm Bodeo Revolver
10.35 Bodeo Revolver
10.4mm Model 1874

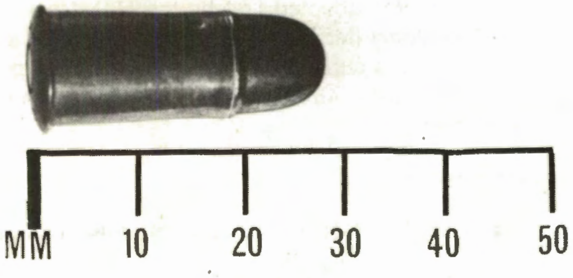


Fig. 19–33.

This cartridge was adopted by the Italian army in 1874 in a Chamelot-Delvigne revolver and later for other types of revolvers. The cartridge was in service in the Second World War and is still manufactured for commercial sale.

CARTRIDGE DETAILS

Case length—20.2mm (case is rimmed and tapered)
Overall cartridge length—30.3mm
Bullet weight (jacketed)—11.3 grams
Muzzle velocity—253 meters per second

10.6 x 25mm R

SYNONYMS **10.6mm German Ordonnanzrevolver**
10.6mm German Model 1879
10.6mm German Model 1884

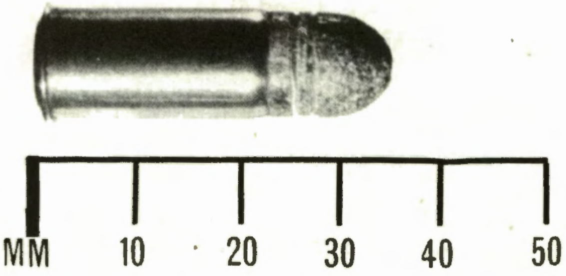


Fig. 19–34.

Used with the Model 1879 ordnance revolver and later with the Model 1884, the 10.6 x 25mm R German round remained in limited service through World War I.

CARTRIDGE DETAILS

Case length—25mm (case is rimmed and straight-sided)
Overall cartridge length—35.5mm
Bullet weight (lead)—16.8 grams
Muzzle velocity—205 meters per second

11 x 17.8mm R

SYNONYMS **11mm French Ordonnance Revolver**
11mm French Modèle 1873

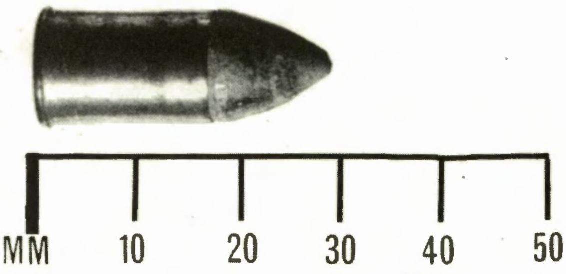


Fig. 19–35.

This cartridge was used in the French ordnance revolver introduced in 1873, a Chamelot-Delvigne-type. Although this handgun was replaced by the 8mm Lebel revolver of 1892, it remained in service for many years thereafter.

CARTRIDGE DETAILS

Case length—17.8mm (case is rimmed and straight-sided)
Overall cartridge length—30mm
Bullet weight (lead, pointed)—11 grams
Muzzle velocity—185 meters per second

11 x 35.8mm R

SYNONYMS **11mm Austrian Ordonnanzrevolver**
11mm Gasser Model 1870
11.3mm Gasser
11.2mm Montenegrin Revolver

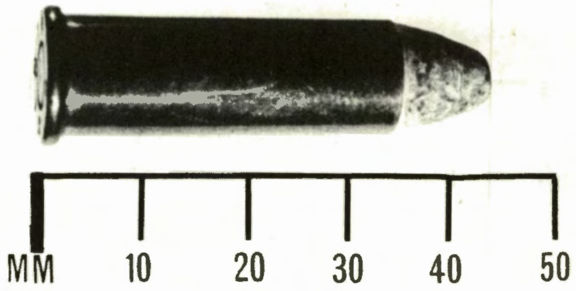


Fig. 19–36.

Introduced with the Austrian Model 1870 revolver deisgned by Gasser, this revolver was sold in large numbers to Montenegro. Cartridges for Montenegro were manufactured by a wide variety of factories.

CARTRIDGE DETAILS

Case length—35.8mm (case is rimmed and straight-sided)
Overall cartridge length—45mm
Bullet weight (lead)—14 to 21 grams
Muzzle velocity—about 215 meters per second

11.18 x 23.5mm R

SYNONYM **.44 Smith & Wesson Russian Revolver**

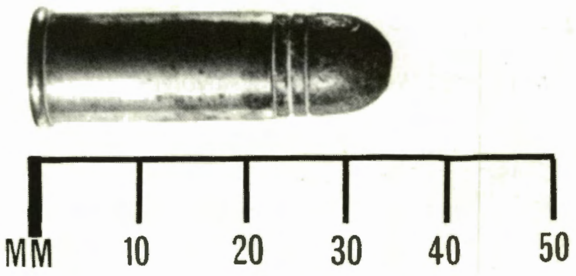


Fig. 19–37.

This cartridge originated in 1870 when the original .44 Smith & Wesson American cartridge was redesigned to Russian specifications for specially-adapted Smith & Wesson revolvers. These handguns were manufactured in the United States for service in the Imperial Russian Army.

CARTRIDGE DETAILS

Case length—23.5mm (case is rimmed and straight-sided)
Overall cartridge length—35mm
Bullet weight (lead)—16 grams
Muzzle velocity—240 meters per second

11.43 x 17.6mm R

SYNONYM **.450 Adams Revolver**

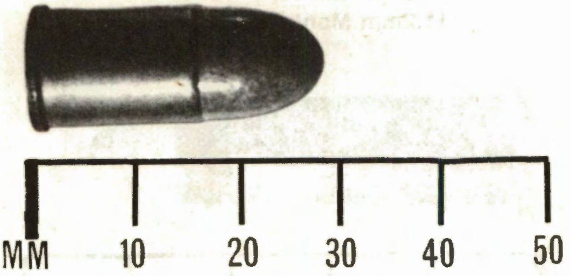


Fig. 19–38.

Designated as the Cartridge SA Ball Pistol Revolver Adams Mark 1, this cartridge was introduced into the British armed forces in 1868, (the Mark 2 version dating from 1877). These cartridges were intended for use in Adams and Tranter revolvers, some of these being conversions from percussion, and others being manufactured as breechloaders. The cases of these rounds were of solid drawn brass, to which were riveted separate bases. The Mark 1 had an iron base and the Mark 2 a brass head.

CARTRIDGE DETAILS

Case length—17.6mm (case is rimmed and straight-sided)
Overall cartridge length—29.5mm
Bullet weight (lead)—14.6 grams
Muzzle velocity—198 meters per second

11.43 x 19mm R (Mark 2)

SYNONYM **.455 Webley Mark 2 Revolver**

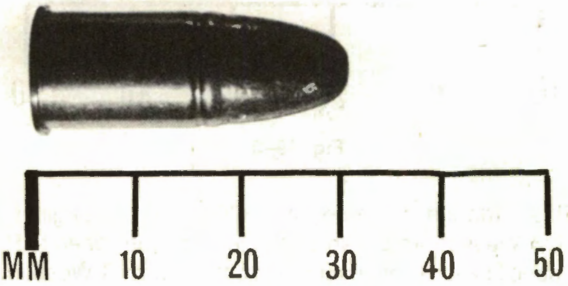


Fig. 19–39.

With the introduction of cordite in place of black powder, it was discovered that advantages arose from reducing the case length of the original Webley Mark 1 cartridge. The new shorter case was fitted to the Mark 2, 3, 4, 5, and 6 cartridges, which were utilized from 1897 to 1945. These Marks differed only as to bullet form.

CARTRIDGE DETAILS

Case length—19.3mm (case is rimmed and straight-sided)
Overall cartridge length—31.7mm (Mark 2)
Bullet weight—(Mark 2, lead; Mark 6, jacketed); 17.2 grams
(Mark 3, 4, and 5) 14.3 grams
Muzzle velocity—177 meters per second

11.43 x 21.7mm R (Mark 1)

SYNONYMS **.455 Webley Mark 1 Revolver**
Cartridge SA Ball Pistol Webley Mark 1
Cartridge SA Ball Pistol Webley, Cordite, Mark 1

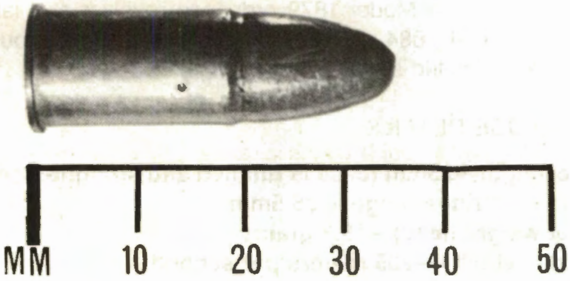


Fig. 19–40.

The black-powder-loaded cartridge was introduced in 1981 and the cordite-loaded equivalent in 1894. The bullet and case were identical, and the cordite version bore a *C* on the head stamp. These cartridges were intended for the Webley, .455 revolvers, which replaced the Enfield, but could also be used in the Enfield revolvers.

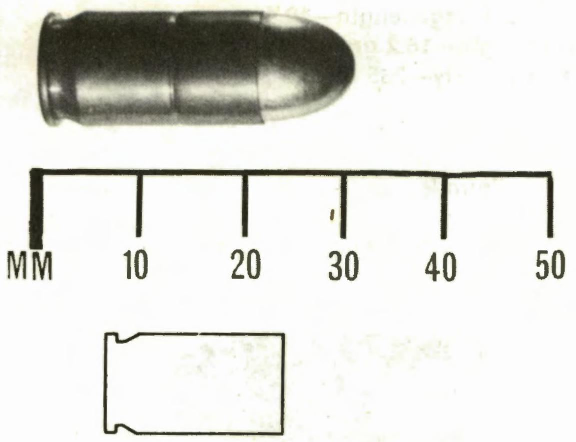
CARTRIDGE DETAILS

Case length—21.7mm (case is rimmed and straight-sided)
Overall cartridge length—37.2mm
Bullet weight—(lead bullets 11.5mm in diameter) 17.2 grams
Muzzle velocity—(cordite Mark 1) 213 meters per second

11.43 x 23mm

SYNONYMS **.45 ACP**
.45 Colt Auto
Cartridge Ball, Cal: .45 M1911
.450 Automatic
11.25mm Norwegian Colt
11.25mm Model 1914

This cartridge was developed by John Browning in 1905 and adopted by the United States for the Model 1911 Colt



11.43x23

Fig. 19–41.

automatic pistol, also designed by Browning. In 1914, Norway adopted the pistol and cartridge under the 11.25mm designation. Argentina has used it in Colt-type automatic pistols and in the Ballester-Molina and HALCON submachine guns; Mexico in the Obregon pistol; and Brazil in the Model INA 953 submachine gun. In addition to the Model 1911 pistol, the following United States military weapons have been chambered for this cartridge: Colt and Smith & Wesson Model 1917 revolvers; Thompson submachine guns, Model 1928 and 1928A1; Reising Model 50, 55, and 60 semiautomatic guns; M1, M1A1, M3, and M3A1 submachine guns; and even a single-shot pistol with a stamped sheet-steel receiver intended to be parachuted into occupied countries for use by resistance movements. Commercial pistols chambered for this cartridge have been made in Spain. The 11.43 x 23mm (.45 ACP) cartridge is notable both for its stopping power (it is the most powerful military pistol cartridge in use today) and for its accuracy in the hands of a well-trained shooter. This cartridge has a practical range in a pistol of 25 meters and in a submachine gun of 50 meters or greater.

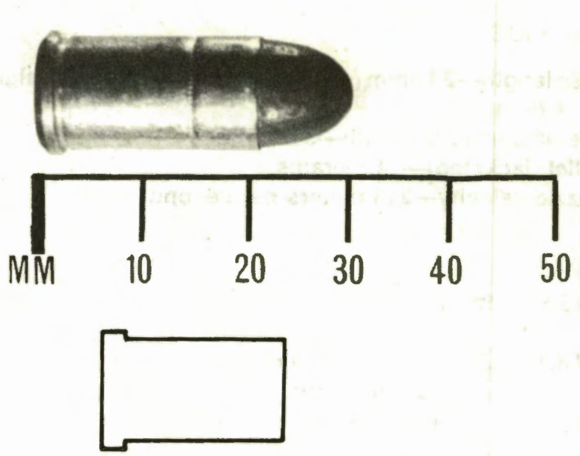
CARTRIDGE DETAILS

Case length—22.7mm (case is rimless and straight-sided)
Overall cartridge length—32.1mm
Bullet weight (service ball bullet, jacketed)—15 grams
Muzzle velocity—250 meters per second

11.43 x 23mm R

SYNONYM **.45 Auto Rim**

Colt and Smith & Wesson Model 1917 revolvers were chambered for the .45 ACP cartridge held in special three-shot clips. The .45 automatic rimmed cartridge, developed after the First World War, did not require a clip.



11.43x23R

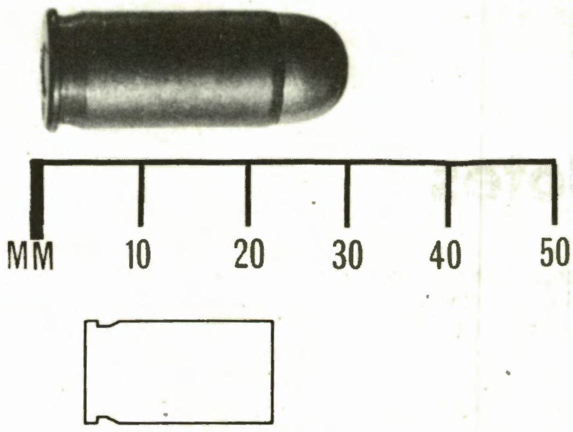
Fig. 19–42.

CARTRIDGE DETAILS

Case length—22.5mm (case is rimmed and straight-sided)
Overall cartridge length—32mm
Bullet weight (lead)—15 grams
Muzzle velocity—253 meters per second

11.43 x 23.5mm SR

SYNONYMS **.455 Webley Auto Pistol**
Cartridge SA Ball Pistol Self-Loading Webley and Scott .455
Mark 1



11.43x23.5SR

Fig. 19–43.

The Royal Navy adopted the .455 Webley & Scott automatic pistol for which this cartridge was used in 1912. The .455 automatic never fully replaced the revolver, although its supplementary use was extended to the air service. It remained in limited military use through the 1939 to 1945 war.

CARTRIDGE DETAILS

Case length—23.5mm (case is semi-rimmed and straight-sided)
Overall cartridge length—31mm
Bullet (jacketed)—14.5 grams
Muzzle velocity—213 meters per second

11.43 x 32.1mm R

SYNONYMS **.45 Colt Revolver**
.45 Colt Army
.45 Long Colt

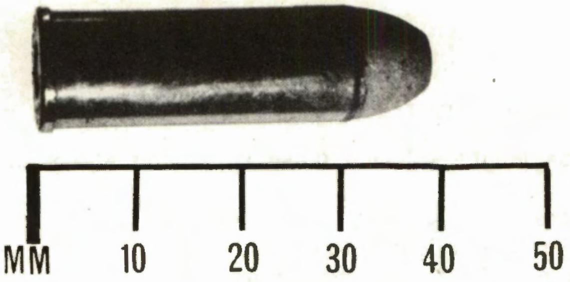


Fig. 19–44.

This cartridge was used in the .45 Colt Army revolver, adopted for the cavalry in 1873. Besides arsenal manufacture, this round has been made commercially in various parts of the world.

CARTRIDGE DETAILS

Case length—32.1mm (case is rimmed and straight-sided)
Overall cartridge length—40.4mm
Bullet weight—16.2 grams
Muzzle velocity—265 meters per second

12.1 x 21.7mm R

SYNONYM **.476 Enfield Revolver**

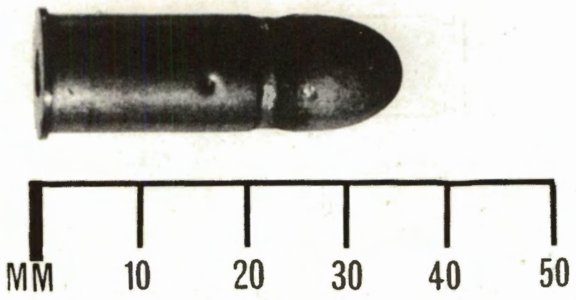


Fig. 19–45.

The first Mark of this cartridge was introduced in 1880, but the most common variant, the Mark 3, dates from 1882. This series was introduced for use with the top-break Enfield revolver, which replaced the underpowdered Adams revolvers in the British armed forces.

CARTRIDGE DETAILS

Case length—21.7mm (case is rimmed and straight-sided; no head stamp)
Overall cartridge length—37mm
Bullet weight—17.2 grams (lead, with a diameter of 12.1mm)
Muzzle velocity—unknown

Notes

All photographs of single cartridges were provided by Peter Labbett, line drawings by the U.S. Army Foreign Science and Technology Center.

Data for this chapter were compiled by Peter Labbett.

Additional reading on military handgun cartridges:

Barnes, Frank C. *Cartridges of the World.* 3d ed. Chicago: Follett Publishing Co., 1972.

Erlmeier Hans A., and Brandt, Jakob H. *Manual of Pistol and Revolver Cartridges. Vol. 1, Centerfire, Metric Calibers.* Wiesbaden: J. E. Erlmeier, 1967.

Hackley, F. W., Woodin, W. H., and Scranton, E. L. *History of Modern U.S. Military Small Arms Ammunition.* Vol. I, *1880–1939.* Vol. II, *1940–1945.* New York: The Macmillan Co., 1967. The Gun Room Press, 1978).

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Edward Clinton Ezell has written and published major articles in magazines and journals including *International Defense Review, National Defense, Gun Week, The Rifle,* and *Military Affairs.* In addition, he has presented technical papers to audiences of the American Association for the Advancement of Science and the Society for History of Technology, and has lectured at numerous institutions of higher learning. His other major book on weapons, *Small Arms of the World,* is generally considered the standard work on the subject.

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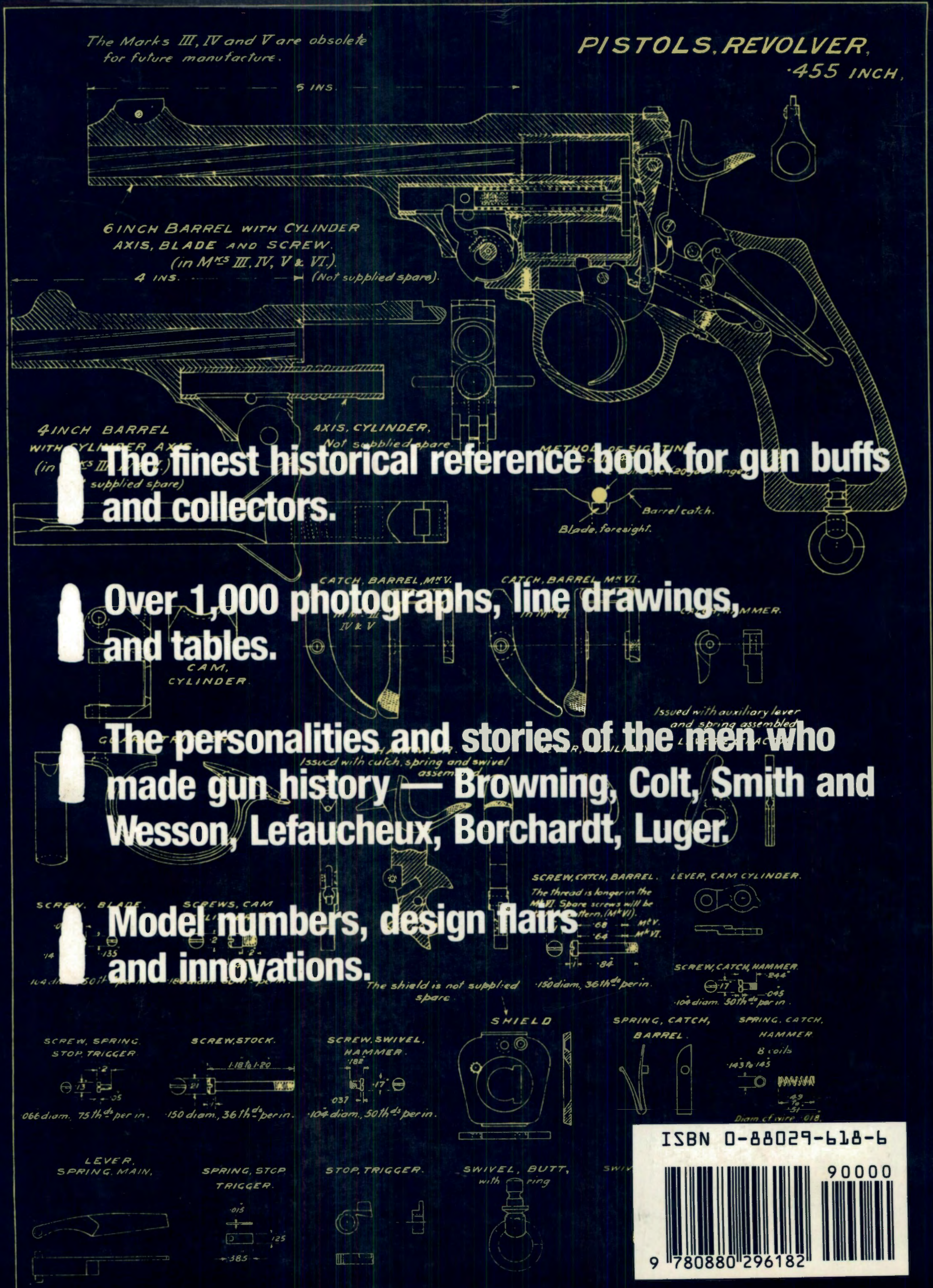

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